2024 STATUS REPORT

GREEN CHEMISTRY COMMITMENT AUDIT RESULTS

beyondbenign
green chemistry education

A MESSAGE FROM THE HIGHER EDUCATION TEAM

2024 was a year of transformative growth and global collaboration within the Green Chemistry Commitment (GCC) program, and we're proud to share what we've achieved together.

We closed the year with a total of 212 signers, collectively reaching an estimated 4,800 faculty members and 1.2 million students annually. This includes an impressive 61 new signers—our most significant year of growth to date. Notably, 67% of these new signers came from institutions outside of the United States, a direct result of Beyond Benign's active presence at five international conferences (Chile, Germany, Brazil, Ireland, and Thailand) and the outreach efforts of GCC signers, their student groups, and 2023-2024 Green Chemistry Education Award recipients, all working to inspire green chemistry education worldwide.

In the U.S., 2024 marked the exciting addition of our first Ivy League signer, Brown University. We also welcomed seven new Minority Serving Institutions (MSIs), which accounted for 34% of new U.S. signers and 12% of all new signers in 2024. Among them was our first institution in Hawaii, the University of Hawai'i Maui College, a Native Hawaiian-Serving Institution (ANNH). Progress toward our 25x25 Initiative continued, with a 3% increase over the previous year—now 13% of chemistry graduates in the U.S. come from GCC institutions annually.

Globally, the GCC extended its reach to a total of 28 countries, welcoming new signers from Austria, Portugal, Japan, Argentina, Bangladesh, and Iran. Latin American institutions represented 16% of the new international signers, and institutions from Africa now account for 8% of all signers. This growing global network reflects the leadership of current GCC institutions and the success of our new GCC Ambassadors program, led by Dr. Juliana Vidal. Our ambassadors help raise awareness and connect like-minded educators across the globe. You can explore our GCC Community Ambassador resources here to see how you can also advocate for the GCC program within your network.

Our work toward inclusion and belonging also continued through the Green Chemistry Teaching and Learning Community (GCTLC). In early 2024, the GCTLC team—working through the Diversity, Equity, Belonging, and Respect (DEBR) Subcommittee and the MSI Community Group—focused on fostering a more inclusive green chemistry education community. The MSI group space, now open to all interested participants, is facilitated by GCC signers and provides a collaborative space for dialogue and connection. These collective efforts resulted in a new publication co-authored by GCC signer Dr. Andrea Oseolorun.

In 2024, Dr. Monica Soma Hensley joined the Beyond Benign team as a Content Manager. Monica has been instrumental in supporting curriculum teams through the Educational Content Developers program. She is leading the launch of the organization's first on-demand online course for GCC signers, set to go live in 2025. Monica also hosted our inaugural Curriculum Showcase Series, which engaged over 100 educators and connected them with resources and support from the GCTLC platform.

In addition, we expanded our support for educators through new funding initiatives. In partnership with MilliporeSigma, the U.S. and Canada Life Science business of Merck KGaA, Darmstadt, Germany, we awarded $80,000 in Green Chemistry Education Grants to 13 university partners around the world. We also launched a new multi-year partnership with Dow, providing $50,000 in grant funding from 2024–2026 to support the development of on-demand courses and collaborations between educators and industry professionals.

This audit report covers data collected from May to September 2024. It is presented in a format consistent with the 2022–2023 report to support long-term tracking and comparative analysis of the GCC program's evolution.

We are deeply grateful to all of you—our signers, partners, and community members—who continue to lead by example and inspire lasting change in chemistry education. Here's to continued progress in the years to come.

THE HIGHER ED TEAM,*

Dr. Amy Cannon
Co-Founder and Executive Director

Dr. Juliana Vidal
Senior Program Manager, Higher Education

Dr. Monica Hensley
Instruction and Research Manager, Higher Education

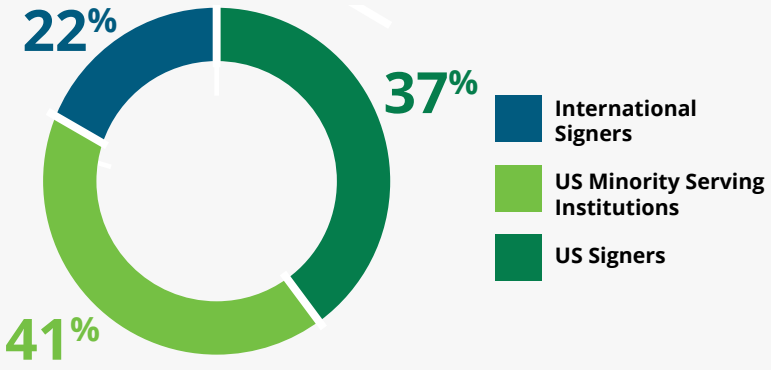
Dr. Omar Villanueva
Chief Program Officer

Dr. Natalie O'Neil
Former Director of Higher Education, Beyond Benign

**This report was made possible and authored by Dr. Natalie O'Neil. We are deeply grateful for her many years of dedicated service to Beyond Benign and her exceptional contributions to the growth of the GCC program. Her work has had a lasting impact on our community and the field of green chemistry education.*

Who answered the audit?

88 respondents



Beyond Benign's presence in five international conferences (Chile, Germany, Brazil, Ireland, and Thailand), as well as workshops and outreach activities organized by the GCC signers, **resulted in increased engagement from international signers in the audit compared to 2023.**

What GCC Signers Said

We have incorporated green chemistry into our strategic plan. That will bring energy and resources to expanding green chemistry education in our department and across campus in the future. As a faculty member, it has reinvigorated my teaching and inspired me to learn and share more with my students.

Being part of the GCC has incredibly impacted my institution and my growth as a faculty member. As a faculty member dedicated to advancing green chemistry in a developing nation, the resources, collaboration opportunities, and funding initiatives opened to my institution as a GCC signing institution have been instrumental in our effort.

Being a GCC signer institution has given us the confidence to explore new initiatives we are interested in with support from a great community. It has provided a network for us to share ideas with other signers in helping spread the reach of green chemistry.

Being part of the GCC has reinforced various campus initiatives related to sustainability and has provided a point of emphasis in student recruitment. Several alumni have gone on to have professional success implementing principles of green chemistry.

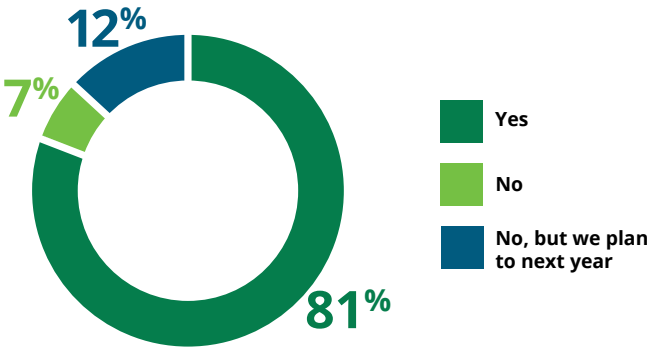
I am very appreciative and grateful to be part of the GCC. This opportunity has allowed faculty members in my department and myself to help educate and aid students in learning and applying green chemistry concepts in the classroom and the laboratory. The GCC has helped our chemistry department reach students not only majoring in STEM areas but also majoring in non-STEM areas such as nursing and psychology. I am very excited and eager about the future that the GCC has provided to our department.

As a very small department, being part of the GCC has given me a community of like-minded peers and access to excellent resources.

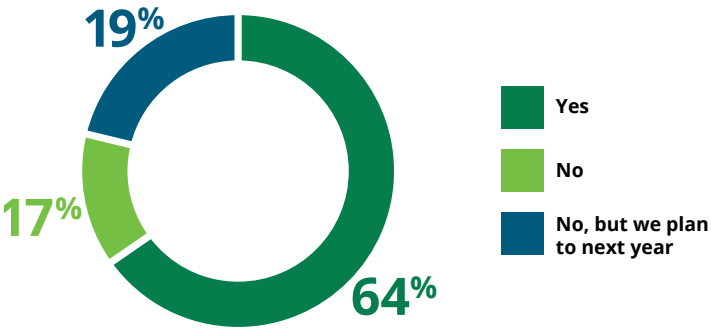
2024 GCC SURVEY DATA

Green Chemistry in Departments, Courses & Programs

Question: Since your institution signed the GCC, has your department (or equivalent) increased its green chemistry teaching and practices?

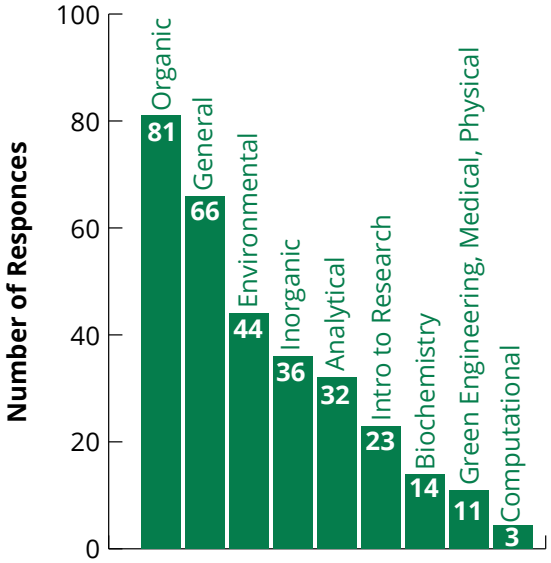


Question: Since your institution signed the GCC, has your institution as a whole incorporated green chemistry and/or sustainability at a broader level?



Signing the GCC is associated with an increase in green chemistry teaching, practices, and broader sustainability adoption.

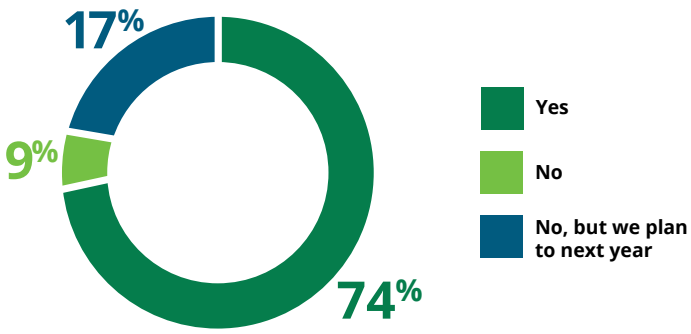
Question: What courses introduce green chemistry as a discussion point at your institution?



Many signers report unique courses. Examples include but are not limited to Art Through Greener Chemistry, Kitchen Chemistry, and many research-based special topics.

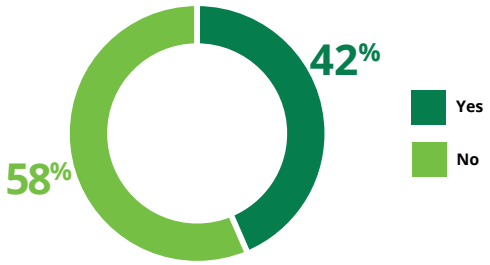
42% of signers have a standalone green chemistry course to introduce green chemistry, and 15% of them have a lab course associated.

Question: Have courses at your institution connected green chemistry to societal issues (e.g. health equity, social justice, environmental justice, climate justice, the UN Sustainable Development Goals, etc.)?

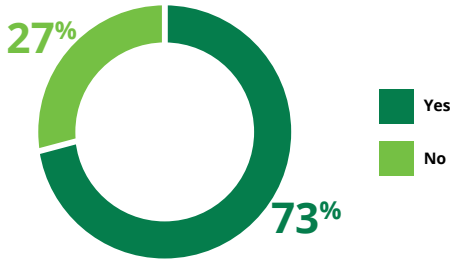


Responses indicate it is very common to link green chemistry to societal issues, we observed a 5% increase in positive responses since 2024.

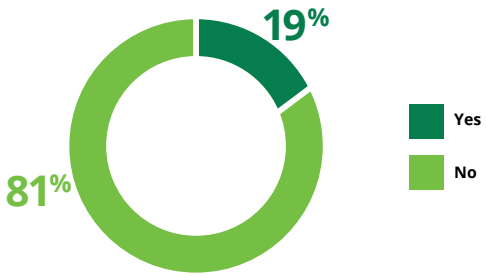
Question: Do you have a standalone green chemistry course at your institution?



Question: Are there any active research groups performing green chemistry in the lab?

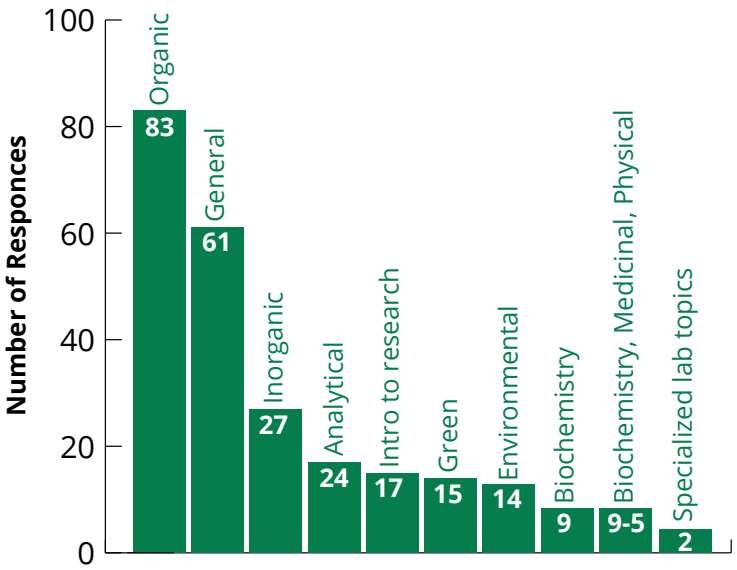


Question: Do you have a standalone green chemistry program (e.g. degree, certification, track, focus, major/minor, option, etc.) at your institution?



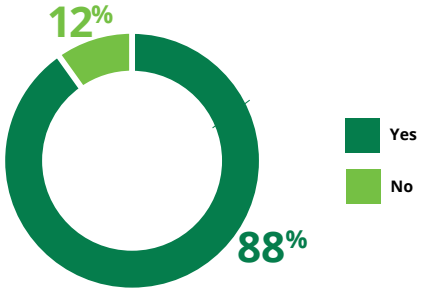
The majority of respondents do not have a standalone course or program.

Question: Courses where Green Chemistry Principles & Practices have been implemented in the teaching laboratory.



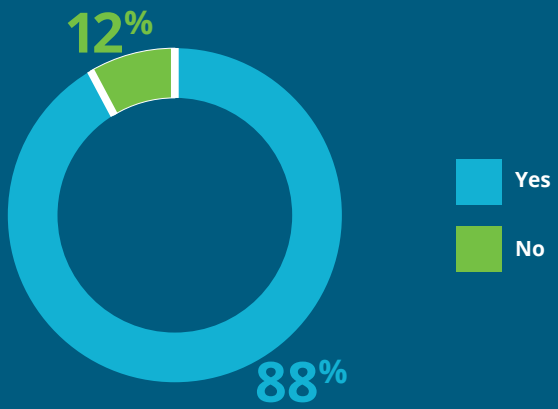
Regarding lab courses, the majority of GCC signers are implementing green chemistry principles and practices in organic chemistry labs.

Question: Have Green Chemistry Principles & Practices been implemented in the teaching laboratory?

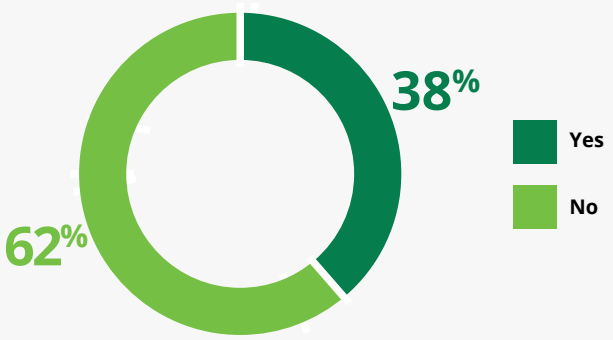


Question: Have you reduced waste by implementing Green Chemistry Principles & Practices into your teaching labs?

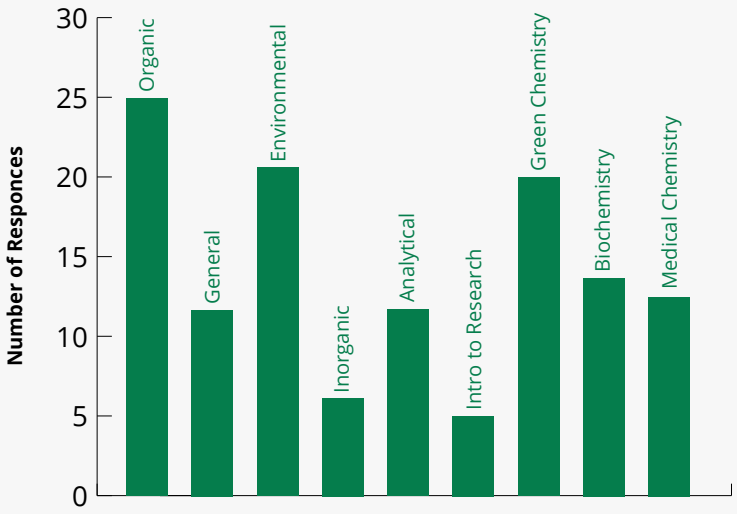
The number of respondents who implemented green chemistry into teaching labs also reported reducing lab waste.



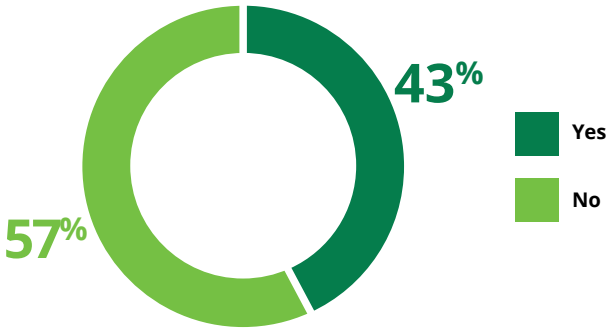
Question: Do you have a standalone toxicology course at your institution?



Question: Please list the courses where toxicology is used as a discussion point at your institution.



Question: Do you offer additional green chemistry courses, seminars, or content within other departments (e.g. Environmental Science, Sustainability, or other related offices/schools)?



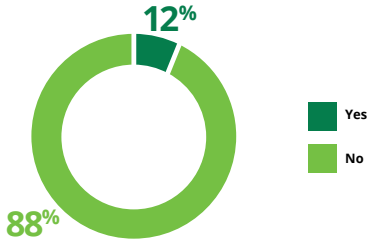
More than half or our signers report collaborating with other departments to implement green chemistry into courses and/or campus-wide practices.

Collaborations were reported with the following departments: (listed from most to least commonly reported)

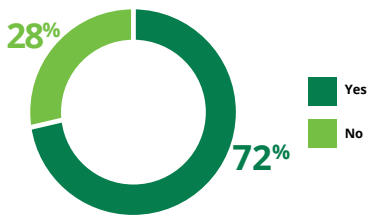
Environmental Science, Sustainability, Biology, Engineering, Environmental Health and Safety, Physics, and Public Health/Health Sciences/ Environmental Health

Student Groups & Community Outreach

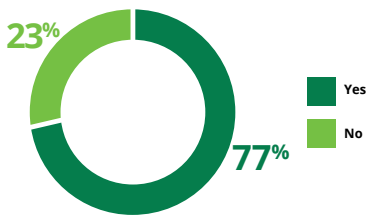
Question: Does your department have a GREEN chemistry student club/group/chapter?



Question: Does your department have a chemistry student club/ group/chapter?



Question: Does your department organize or participate in community and/or K-12 outreach?



The majority of our Signers have chemistry student groups in their departments; **However, these student groups are not often green chemistry-specific.**

2023–2024 GREEN CHEMISTRY COMMITMENT AWARD WINNERS

In December 2023, Beyond Benign selected 13 Green Chemistry Education Award winners, and in January 2024, distributed $80,000 to university partners around the world through the GCC awards program.

The Green Chemistry Education Awards provide financial support for the integration of green chemistry education into courses and curricula. Award winners receive funding to support work to:

- Increase the awareness of green chemistry and the GCC program across the chemistry department and institution.
- Increase awareness of the institution's dedication to green chemistry education through conference attendance, webinars, publications, social media campaigns, and other opportunities.
- Transform curriculum and lab procedures to achieve the GCC's Student Learning Objectives. The objectives aim to provide all chemistry graduates with proficiency in essential green chemistry competencies of Theory, Toxicology, Application, and Laboratory skills.

Minority Serving Institute (MSI) Education Awards

In support of our Minority Serving Institute initiative, we distributed three awards of $10,000 USD each for GCC Signer MSI to accomplish projects that advance the teaching and learning of green chemistry. The following proposals were awarded grants for the 2023-2024 academic year.

CALIFORNIA STATE UNIVERSITY SAN MARCOS

Award Lead: Robert Iafe

Proposal: The Department of Chemistry & Biochemistry will be establishing a new Green Chemistry minor starting in September 2025. To achieve this goal, two courses will be developed: a Green Chemistry course and a Toxicology course, using open-access curricular resources from Beyond Benign. Specific student learning objectives and course content will be adapted to suit a majority Hispanic/LatinX student population in collaboration with the LatinX Center on campus. In collaboration with Institutional Planning and Analysis and other campus partners, qualitative and quantitative data will be collected from all chemistry and biochemistry majors and assessed to evaluate student success, persistence, and self-efficacy in the university. Finally, California State University San Marcos, will host a public university-wide seminar on green chemistry. The goal of the seminar is to increase the retention of students in chemistry research by exposing them to cutting-edge green chemistry research.

PONTIFICAL CATHOLIC UNIVERSITY OF PUERTO RICO

Award Lead: Adalgisa Batista-Parra

Proposal: The Pontifical Catholic University of Puerto Rico will redesign the curriculum for their organic chemistry laboratory courses to integrate green chemistry principles. Curriculum materials will reflect current and emerging trends in green chemistry and sustainable chemistry education. Greener synthetic routes for current laboratory experiments, where the use of safer solvents and reagents

will be prioritized. Selected greener synthetic routes will be tested in a pilot group before their implementation throughout the undergraduate laboratory courses. Data will be collected on the amount of chemical waste disposal, the amount of solvent usage, and the financial impacts of implementing safer solvents and reagents, and will be compiled into a comprehensive report shared with the Pontifical Catholic University of Puerto Rico's stakeholders, including faculty, students, and the university administration. Ultimately, the course redesign will enhance student learning experiences and promote green chemistry awareness and knowledge, and sustainable practices across the department.

STELLA AND CHARLES GUTTMAN COMMUNITY COLLEGE (CUNY)

Award Lead: Jihyun Kim

Proposal: Stella and Charles Guttman Community College (CUNY), will redesign their organic chemistry laboratory I and II courses to incorporate microscale glassware kits and additional green chemistry practices for implementation during the September 2024 to May 2025 semesters. 10 new modules will be incorporated into the organic chemistry laboratory curricula, incorporating the use of new microscale glassware kits. Beyond Benign and the green chemistry community will be introduced to students, and an overview of the 12 Principles of Green Chemistry and their application in organic chemistry will be provided. Throughout the course, students will discuss the importance of sustainability, environmental impact, and responsible practices in organic chemistry. Microscale apparatus kits will be introduced alongside traditional synthesis kits to help students better understand the purpose of employing microscale kits and their benefits and challenges. Success and progress will be measured by using assessment methods to evaluate student understanding of green chemistry concepts and their ability to apply them in organic chemistry laboratory settings.

MilliporeSigma Green Chemistry Education Awards

Thanks to support from MilliporeSigma, the Life Science business of Merck KGaA, Darmstadt, Germany, ten (10) awards of $5,000 USD each were available for GCC signing institutions to drive awareness or support the adoption of green chemistry into courses, laboratories, and/or outreach activities. We awarded the following ten proposals grants for 2023-2024:

AMBROSE UNIVERSITY

Award Lead: Kristian Caldo

Proposal: Ambrose University will introduce undergraduate biochemistry laboratory students to green chemistry principles by applying biochemical techniques in converting agricultural feedstock into value-added byproducts. Specifically, an efficient and sustainable process for extracting proteins from canola meal will be developed for implementation in an undergraduate biochemistry laboratory course. Through this experiment, students will discuss how using agricultural by-products in this way is crucial in meeting the future demand for plant-based protein sources. This project will also expose students to circular economy principles in reducing the environmental impact of farming and food production by converting agricultural waste into useful protein products.

CITY UNIVERSITY OF HONG KONG

Award Lead: Carol Lin

Proposal: City University of Hong Kong will implement an assignment in an undergraduate course for environmental engineering students to fully understand the concept of Life Cycle Assessment (LCA) and green chemistry. The product system studied is the production of crude sophorolipids (i.e. biosurfactant, commonly used as an ingredient of cleaning agent) using food waste and soybean oil as substrate.

The environmental impacts/burdens associated with the production of sophorolipids using waste stream substrate food waste instead of first-generation substrate glucose are analyzed based on Life Cycle (LCA) approach using the SIMAPRO software. The environmental analysis includes all the processes related to the collection and treatment of food waste till the fermentation of crude sophorolipids. Through this assignment, students will develop a deeper understanding of the environmental implications of chemical processes and products and will additionally serve as motivation for exploring the principles of green chemistry.

GEORGIA GWINNETT COLLEGE

Award Lead: Jennifer Hendrickson and Cynthia Woodbridge

Proposal: The Green Chemistry Task Force and the chemistry faculty at Georgia Gwinnett College will create a green chemistry course, including tracks for majors and a minor. To achieve this, first, a series of 12 events will be run over one year to build awareness on campus and with community collaborators. Each monthly session will focus on a Green Chemistry Principle and will include a lecture from a guest speaker and activities to support learning around the Principle. The sessions will build awareness for students in green chemistry by creating interactive avenues to explore green chemistry. Additionally, faculty will be provided with professional development opportunities to create a green chemistry curriculum using activities to enhance their own learning as well as student learning. Finally, collaborations with internal student programs and external businesses will be created.

HARRISBURG UNIVERSITY OF SCIENCE AND TECHNOLOGY

Award Lead: Yiben Wang

Proposal: Harrisburg University of Science and Technology will host two collaborative professional development workshops in July/August 2024 for local high school teachers partnered with the university through the College in High School program. Teachers will be trained in demonstrating and facilitating greener laboratory experiments by faculty and two undergraduate students from the Department of Chemistry. This project will foster and accelerate the growth of green chemistry at Harrisburg University and its partner high school institutions.

MCGILL UNIVERSITY

Award Lead: Julian Marlyn and Green Chemistry McGill student group

Proposal: The Green Chemistry McGill Student Group at McGill University will implement three projects to implement actionable changes within research and teaching labs, strengthen community awareness and involvement with green chemistry, and enrich departmental communal spaces. First, an acetone recycling pilot program will be implemented, designed to reduce waste from teaching laboratories. Monthly green chemistry coffee hour talks will connect the green chemistry community within the department. Finally, the Green Chemistry McGill Awareness Day—a one-day green chemistry conference open to the local campus and community—will be hosted. These projects will improve the green chemistry community, resources, and discussion within the Department of Chemistry at McGill, while additionally strengthening the inclusion of sustainability research practices.

TAI SOLARIN UNIVERSITY OF EDUCATION

Award Lead: Oyesolape Basirat Akinsipo nee Oyelaja and Oluwaseun Anselm

Proposal: The Tai Solarin University of Education will organize and host a five-day virtual green chemistry program for institutions across Nigeria to create a platform for inter-institutional discussions and to hold an inter-university competition. The program will include panel discussions with green chemistry advocate faculty

members from different institutions across the country to share the successes and challenges of green chemistry practices in their institutions and the sustainability of its incorporation throughout curricula. Students will be invited to participate in an inter-institutional competition, while showcasing their green chemistry research and outreach projects. This highly collaborative event will ultimately lead to a richer integration of green chemistry in curricula across institutions in Nigeria.

UNIVERSIDADE ESTADUAL DE PONTA GROSSA

Award Lead: Marilei Casturina Mendes Sandri

Proposal: Universidade Estadual de Ponta Grossa (UEPG) will redesign its organic chemistry laboratory course to include Green Chemistry Principles and practices. Experiments will be modified to make use of and address green chemistry metrics, safer solvents and reagents, energy and resource conservation, and waste reduction. The organic chemistry laboratory's physical spaces will also be improved to accommodate safer lab practices. This course redesign will contribute to increasing the green chemistry culture and adoption at UEPG amongst the faculty and will ultimately help foster the inclusion of green chemistry content across the chemistry courses.

UNIVERSITY OF CALGARY

Award Lead: Ashley Scott Causton

Proposal: The University of Calgary will implement green chemistry principles and practices throughout its undergraduate chemistry curriculum. They will accomplish this by revitalizing their green chemistry course that has not been offered since 2015, and by reviewing downstream courses to include green chemistry knowledge and skills learned in the independent course. The green chemistry course will be redesigned to include high-impact learning activities and content material focusing on green chemistry principles. Feedback will be collected from students taking the course to understand how downstream courses, including laboratory courses, can be improved to include green chemistry content. The green chemistry course will be offered to students from other programs such as biology, medicine, natural sciences, and engineering for universal green chemistry adoption.

UNIVERSITY OF TORONTO

Award Lead: Alicia Battaglia and the Green Chemistry Initiative student group

Proposal: The Green Chemistry Initiative at the University of Toronto will facilitate a workshop for graduate students in March 2024 in collaboration with Beyond Benign and will support graduate students' green chemistry professional development at their annual Symposium in May 2024 with these award funds. This new workshop and the annual Symposium will increase the awareness of green chemistry across the chemistry department and related faculties at the University of Toronto as well as other universities across Canada and the United States.

VISAYAS STATE UNIVERSITY TOLOSA

Award Lead: Jerald Villarmino

Proposal: Visayas State University Tolosa will implement and include green chemistry content, principles, and materials across all chemistry lectures and laboratory courses. A comprehensive redesign of the courses will be completed collaboratively across the department, including the implementation of new equipment in the teaching laboratories to foster safety and green lab practices. Undergraduate students will be enabled and empowered to apply green chemistry skills and knowledge outside of their educational courses. Ultimately, this comprehensive integration of green chemistry content will help to create a culture of awareness at Visayas State University Tolosa, and throughout institutions in the Philippines.

PUBLICATIONS AND PROMOTIONAL ACTIVITIES

In 2024, the Higher Education team at Beyond Benign marked a significant milestone with the publication of a flagship article celebrating a decade of the Green Chemistry Commitment. The paper, "A Promise to a Sustainable Future: 10 Years of the GCC at Beyond Benign," was published in the 25th Anniversary of Green Chemistry Special Issue of the Green Chemistry journal by the Royal Society of Chemistry. Recognized for its significance, the article was selected as a 2024 Green Chemistry Hot Article by the RSC and has been cited 7 times to date.

The team also contributed a chapter titled "Emerging Approaches for Green Chemistry Education: Systemic Changes for a Sustainable Future" to the *Encyclopedia of Green Chemistry*, edited by Prof. Bela Torok (University of Massachusetts Boston), further reinforcing the program's thought leadership in sustainable chemistry education.

Additional 2024 publications highlighting the GCC program include:

- Freese, T.; Vidal, J. L.; George, M. W.; Warner, J. C.; Poliakoff, M.; Feringa, B. L. Green and Sustainable Chemistry for a Circular Economy. *The Sustainability of Science*, Farley, M., Ed.; Royal Society of Chemistry, 2025.
- Dobbelaar, E.; Goher, S. S.; Vidal, J. L.; Obhi, N. K.; Felisilda, B. M. B.; Choo, Y. S. L.; Ismail, H.; Lee, H. L.; Nascimento, V.; Al Bakain, R.; et al. Towards a Sustainable Future: Challenges and Opportunities for Early-Career Chemists. Angew. Chem. Int. Ed., 2024, 63 (35), e202319892. DOI: https://doi.org/10.1002/anie.202319892.
- Choo, Y. S. L.; Fung, F. M.; Vidal, J. L. The PARTY Approach: How Friendship Transcended Borders for Science. *Chem. Int*., 2024, 46 (3), 6. DOI: https://doi.org/10.1515/ci-2024-0302.

The GCC program also supported the visibility and dissemination of the work promoted by the community through partnerships and engagement with journals such as Green Chemistry Letters & Reviews, Sustainability & Circularity NOW, and Pure and Applied Chemistry, from IUPAC. Highlighted publications in 2024 include:

- Dilip, M.; Kerr, M. E. Circles of sustainability: an activity for visualizing synergies and trade-offs in a systems thinking environment. *Green Chem. Lett. Rev*., 2024, 17 (1), 2381596. DOI: https://doi.org/10.1080/17518253.2024.2381596.
- Tordato, E. A.; Castilho, S. A.; Milagre, H. M. S.; Milagre, C. D. F. Simultaneous and sequential enzymatic cascades for asymmetric synthesis of chiral beta-hydroxyamide derivatives promoted by alcohol dehydrogenases and nitrile hydratases. *Green Chem. Lett. Rev*., 2024, 17 (1), 2343707. DOI: https://doi.org/10.1080/17518253.2024.2343707.
- Tracey, M. P.; Nigam, M.; Pirzada, E.; Osman, T. A solventless carbonyl addition reaction as a guided inquiry laboratory activity for second-year undergraduate organic students. *Green Chem. Lett. Rev*., 2024, 17 (1), 2400121. DOI: https://doi.org/10.1080/17518253.2024.2400121.
- Sauceda-Oloño, P. Y.; Kapuge Dona, N. L.; Smith, R. C. The quest for environmentally benign plastics: advances in greener and more sustainable flame retardant formulations. *Green Chem. Lett. Rev*., 2024, 17 (1), 2402403. DOI: https://doi.org10.1080/17518253.2024.2402403.
- Milagre, C. D. F.; Milagre, H. M. S.; Silva, D. H. S.; Cavalcanti, V. H. O.; Neto, L. G. Paths and synergies in accelerating the UN 17 SDGs through the lens of green chemistry: contributions from a Brazilian university and its Institute of Chemistry. *Pure Appl. Chem*., 2024, 96 (9), 1279. DOI: https://doi.org/10.1515/pac-2024-0232/
- Júnior, C. A. S.; Júnior, G. G.; Morais, C.; Jesus, D. P. d. Green chemistry for all: three principles of Inclusive Green and Sustainable Chemistry Education. *Pure Appli. Chem*., 2024, 96 (9), 1299-1311. DOI: https://doi.org/10.1515/pac-2024-0245.

A notable highlight in October 2024 was an interview conducted by the Higher Education team with Dr. Laura MacManus Spencer (Union College) and 2024 ACS President Dr. Mary Carroll. The interview explored the synergy between the GCC and the ACS Approval Program for Undergraduate Chemistry, emphasizing shared goals in transforming undergraduate chemistry education.

This momentum supports our 2025 goal of having 25% of U.S. undergraduate chemistry students enrolled at a GCC-signing institution, reinforcing the growing alignment between academic institutions and the global call for sustainable chemistry education.

GCC Events & Global Engagement Summary

In 2024, Beyond Benign and the GCC community catalyzed a dynamic array of events to promote green chemistry education and support current and future signers. These activities spanned more than 40 events across six continents, reaching thousands of educators, students, and institutions. Highlights include:

WEBINARS & VIRTUAL SERIES

- 3 GCC Info Sessions with an average attendance of 37% and direct impact on 7 new institutional signings.
- GCC Curriculum Showcase Series spotlighted innovative course materials developed by GCC Educational Content Developers.
- Global webinars and collaborative symposia, including LatinXChem, IUPAC Committee on Chemistry Research Applied to World Needs (CHEMRAWN), and the GCTLC platform.

THE 2024 GREEN CHEMISTRY COMMITMENT SUMMIT

Held in person and also virtually across two time zones to accommodate a global audience, this year's Summit drew 131 institutions, showcasing new resources, breakout discussions, and publishing opportunities for signers.

CONFERENCES & IN-PERSON EVENTS

Beyond Benign and GCC Community Ambassadors participated in 10+ major conferences and symposia, including:

- ACS Spring 2024 Meeting & Expo (USA)
- 28th Annual Green Chemistry & Engineering Conference (USA)
- 9th EuChemS Chemistry Congress (Ireland)
- 47th Annual Meeting of the Brazilian Chemical Society (Brazil)
- Change Chemistry's 2024 Innovators Roundtable (USA)
- 27th IUPAC Conference on Chemistry Education (Thailand)

REGIONAL & AMBASSADOR-LED ENGAGEMENT

- GCC Ambassadors led regional workshops, GCC Signing Celebrations, and educator engagement in the U.S., Latin America, Canada, Europe, Asia-Pacific, and Africa.
- Local efforts in Chile, Brazil, Nigeria, Germany, and Canada led to enhanced regional visibility and signer expansion.

CURRICULUM INNOVATION & EQUITY-FOCUSED SUPPORT

- GCC Educational Content Developers and pilot testers created and piloted new curriculum modules and case studies on topics like ChemFORWARD, Superfund sites, and environmental justice.
- Direct support was provided to BIPOC and MSI faculty and students to publish, present, and innovate in green chemistry education.

Together, these initiatives reflect the expanding global impact of the GCC program, which not only increases signer recruitment and community engagement but also fosters leadership, inclusivity, and educational innovation in sustainable chemistry.

Opportunities: Expanding Our Impact Through Partnership

The GCC program is experiencing unprecedented momentum. In 2024, we supported the development of new green chemistry curricula, empowered diverse faculty leaders, and built a global network of institutions committed to transforming chemistry education. Still, the opportunity ahead is even greater.

Many institutions—particularly large research and education hubs—are ready to implement green chemistry principles into their courses, laboratories, and departmental strategies. But sustained support and funding are essential to help them make that transition successfully.

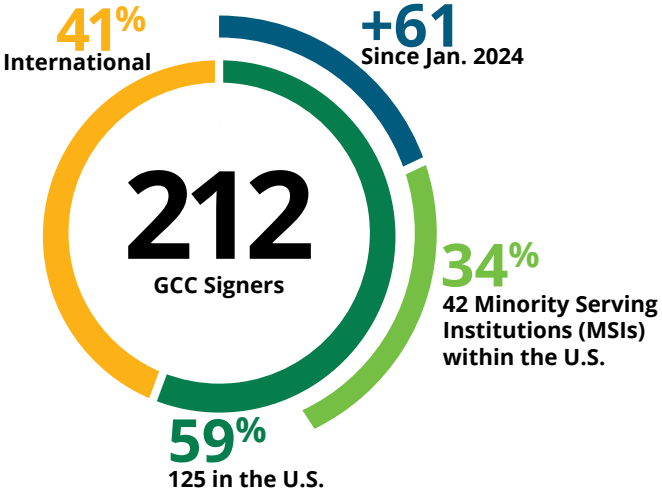
We see a powerful path forward. With additional investment, we can:

- Expand our Green Chemistry Education Awards to support more departments and faculty innovators.
- Grow our network of curriculum developers, mentors, and ambassadors across geographic and institutional boundaries;
- Enhance access to on-demand training and collaborative tools through platforms like the GCTLC.

This is an invitation to our funders, partners, and changemakers. Join us in accelerating a systemic shift toward safer, more sustainable chemistry education worldwide. **Together, we can ensure that all chemistry students—regardless of location or background—have access to the knowledge and skills needed to create a healthier, more sustainable future.**

APPENDIX

Meet the GCC Community*

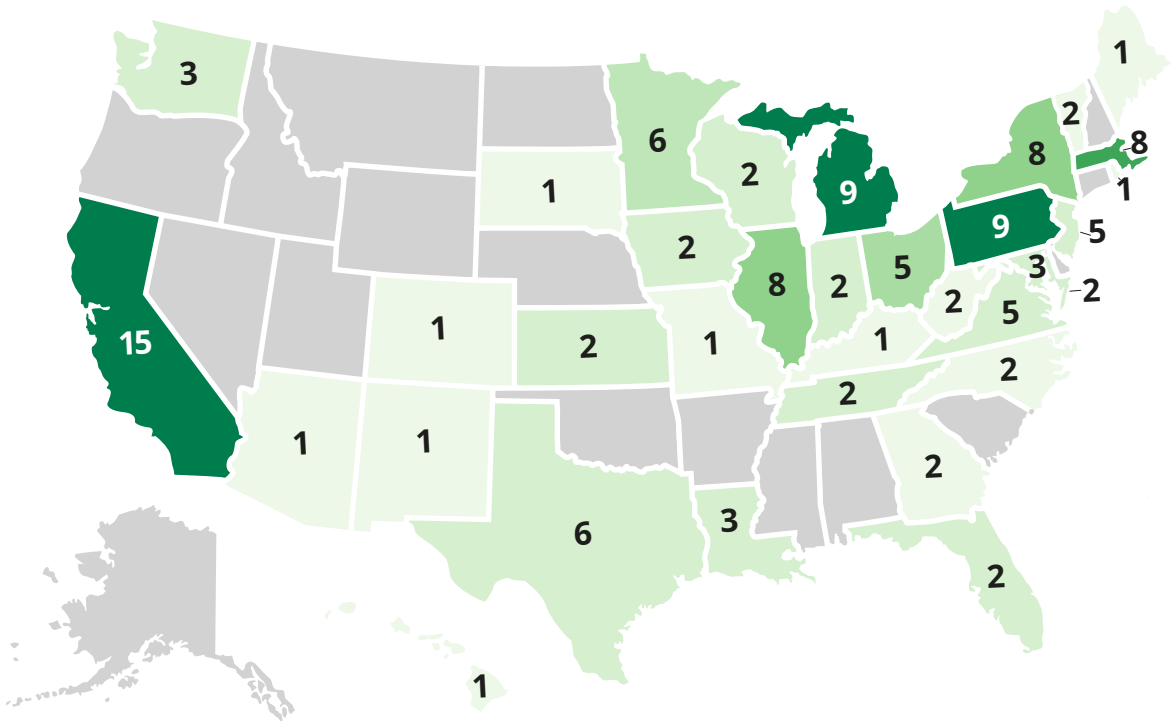


Over **4,800 faculty members**
Reaching **1.2 million** students annually

**The data represented here is as of December 2024.*

GREEN CHEMISTRY COMMITMENT SIGNERS

GCC USA Signers by State



Arizona
- Northern Arizona University

California
- University of California, Berkeley
- College of the Canyons
- University of California, Davis
- Las Positas College
- Loyola Marymount University
- University of California, San Diego
- Harvey Mudd College
- University of California, Santa Barbara
- Claremont McKenna College
- Pitzer College
- Scripps College
- California State University San Marcos
- Biola University
- Saint Mary's College of California
- University of California, Santa Cruz

Colorado
- University of Colorado, Colorado Springs

Florida
- Florida Gulf Coast University
- Florida Southern College

Georgia
- Augusta University
- Georgia Gwinnett College

Hawaii
- University of Hawai'i Maui College

Indiana
- Rose-Hulman Institute of Technology
- Earlham College

Iowa
- Iowa Lakes Community College
- Buena Vista University

Illinois
- Elmhurst University
- Millikin University
- North Park University
- Bradley University

GREEN CHEMISTRY COMMITMENT SIGNERS

- Monmouth College
- Dominican University
- Chicago State University
- DePaul University

Kansas
- McPherson College
- Tabor College

Kentucky
- Berea College

Louisiana
- Dillard University
- Southern University and Agricultural & Mechanical College
- Franciscan Missionaries of Our Lady University

Massachusetts
- Bridgewater State University
- Gordon College
- Northeastern University
- Simmons University
- Northern Essex Community College
- Salem State University
- Stonehill College
- Worcester State University

Maryland
- Loyola University Maryland
- Washington College
- Salisbury University

Maine
- University of New England

Michigan
- Grand Valley State University
- Michigan Technological University
- Lawrence Technological University
- Michigan State University
- Siena Heights University
- University of Detroit Mercy
- University of Michigan-Flint
- Wayne State University
- University of Michigan

Minnesota
- Augsburg University
- St. Catherine University
- University of Minnesota
- University of Minnesota Morris
- Winona State University
- University of Minnesota, Duluth

Missouri
- Saint Louis University

New Jersey
- Ramapo College of New Jersey
- Montclair State University
- Seton Hall University
- Kean University
- The College of New Jersey

New Mexico
- Central New Mexico Community College

New York
- Kingsborough Community College
- State University of New York at Fredonia
- Siena College
- Utica University
- Rochester Institute of Technology
- Union College
- Hofstra University
- Stella and Charles Guttman Community College, CUNY

North Carolina
- University of North Carolina at Pembroke
- North Carolina State University

Ohio
- Bluffton University
- University of Toledo
- Wittenberg University
- Wright State University
- Ohio Northern University

GREEN CHEMISTRY COMMITMENT SIGNERS

Pennsylvania
- Drexel University
- Saint Francis University
- Penn State Shenango
- Widener University
- Wilkes University
- York College of Pennsylvania
- University of Pittsburgh, Johnstown
- Villanova University
- Harrisburg University of Science and Technology

Rhode Island
- Brown University

South Dakota
- South Dakota State University

Tennessee
- Tennessee Tech University
- Milligan University

Texas
- Prairie View A&M University
- Texas A&M University-San Antonio
- Texas Woman's University
- Odessa College
- Texas Agricultural & Mechanical University, San Antonio
- St. Edward's University

Vermont
- Norwich University
- University of Vermont

Virginia
- Eastern Mennonite University
- Randolph College
- Hampton University
- Virginia Polytechnic Institute & State University
- Virginia State University

Washington
- Green River College
- Pacific Lutheran University
- Bellevue College

West Virginia
- West Virginia State University
- Bluefield State University

Wisconsin
- Edgewood College
- University of Wisconsin-Whitewater

U.S. TERRITORIES:

Puerto Rico
- University of Puerto Rico, Rio Piedras
- Pontifical Catholic University of Puerto Rico

District of Columbia
- George Washington University

GREEN CHEMISTRY COMMITMENT SIGNERS

GCC International Signers | December 2024

Africa

- Bingham University (Nigeria)
- First Technical University (Nigeria)
- Kabete National Polytechnic (Kenya)
- Rhodes University (South Africa)
- Tai Solarin University of Education (Nigeria)
- Federal University Lafia, Nigeria (Nigeria)
- University of Calabar (Nigeria)
- Akwa Ibom State University (Nigeria)
- Faculty of Education, University of Lagos (Nigeria)
- Federal University Wukari (Nigeria)

Asia

- Dnyanprassarak Mandal's College and Research Centre (India)
- Chulalongkorn University (Thailand)
- R.V. College of Engineering, RVCE (India)
- Kyoto University (Japan)
- University Of Rajshahi (Bangladesh)
- Amity University Punjab (India)
- University Of Hormozgan (Iran)
- Sanjay Ghodawat University, Kolhapur (India)
- JECRC University (India)
- Hindu College Delhi University (India)
- Somaiya Vidyavihar University (India)
- K J Somaiya College of Science and Commerce (India)
- City University of Hong Kong (CityU) (Hong Kong)
- Visayas State University Tolosa (Philippines)

Australia

- Monash University

Europe

- Queen's University Belfast (UK)
- Stockholm University (Sweden)
- Technische Universität Berlin, TU Berlin (Germany)
- University of Bath (UK)
- University of Birmingham (UK)
- University College Cork (Ireland)
- University College Dublin (Ireland)
- Universität Duisburg-Essen (Germany)
- University of Wuppertal (Germany)
- University of York (UK)
- Newcastle University (UK)
- Universidade De Coimbra (Portugal)
- Technische Universität Wien (TU Wien) (Austria)
- Università Ca'Foscari Venezia (Italy)
- Università di Bologna (Italy)
- University of Groningen (Netherlands)
- Leuphana University (Germany)
- Ghent University (Belgium)
- Freie Universität Berlin (Germany)
- Humboldt Universität Zu Berlin (Germany)
- Manchester Metropolitan University (UK)
- University of Lincoln (UK)
- University of Nottingham (UK)

North America

- Ambrose University (Canada)
- University of Toronto (Canada)
- Vancouver Island University (Canada)
- McMaster University (Canada)
- McGill University (Canada)
- The University of British Columbia (Canada)
- Cape Breton University (Canada)
- University of Prince Edward Island (Canada)
- Queen's University, Ontario (Canada)
- British Columbia Institute of Technology (BCIT) (Canada)
- Mohawk College of Applied Arts and Technology (Canada)
- Concordia University Montréal, QC (Canada)
- Collégial International Sainte-Anne (Canada)
- The University of Winnipeg (Canada)
- University of Calgary (Canada)
- University of Victoria (Canada)

GREEN CHEMISTRY COMMITMENT SIGNERS

- Mohawk College of Applied Arts and Technology (Canada)
- Universidad de San Carlos De Guatemala (Guatemala)

South America

- IFRJ – Campus Duque de Caxias (Brazil)
- Universidade Estadual Paulista (Unesp), Araraquara (Brazil)
- Universidade de Brasilia (Brazil)
- Universidad de la Costa (Columbia)
- Universidade Federal de Pelotas (Brazil)
- Univeridad EAN (Colombia)
- Universidade Federal de Goiás – UFG (Brazil)
- Universidade Federal do Mato Grosso do Sul – UFMS (Brazil)
- Universidad Federal de Pelotas (Brazil)
- Yachay Tech University (Ecuador)
- Federal Institute of Education, Science and Technology of Paraíba (IFPB) (Brazil)
- Universidade Federal de Minas Gerais (UFMG) (Brazil)
- Instituto Federal Do Espírito Santo, Vila Velha (Brazil)
- Instituto de Quimica Universidade Estadual de Campinas (Brazil)
- Universidad Nacional de Villa María (Argentina)
- Universidade Federal Fluminense (UFF) (Brazil)
- Pontificia Universidad Católica de Chile (Chile)
- Universidade Federal do Piauí (UFPI) (Brazil)
- Institute of Chemistry - Universidade de São Paulo (Brazil)
- Universidad de La Salle (Colombia)
- Instituto Federal do Paraná (IFPR), Campus Palmas (Brazil)
- Universidade Estadual de Ponta Grossa (Brazil)
- Universidad de Santiago de Chile (Chile)

THANKS TO OUR PARTNERS