

Louisiana Space Grant Consortium
Louisiana State University (LSU)
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Lines of Business (LOBs): NASA Internships, Fellowships, and Scholarships;
Stem Engagement; Institutional Engagement; Educator Professional Development

A. PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Louisiana Space Grant Consortium is a Designated, Program Grant Consortium funded at a level of \$720,000 for fiscal year 2016.

B. PROGRAM GOALS

1) Foster aerospace related, interdisciplinary, science, technology, and engineering research and education at Louisiana colleges and universities. [NASA LOB 2 and 3]

Objectives: Maintain the LaSPACE LURA and GSRA programs; Maintain the number of Minority Scholars; Maintain the total number of REA applications per year; Reintroduce the URP and RIG programs as conditions warrant; Increase the number of LaSPACE sponsored research groups applying for federal support by 2% each year; Include a session for students to report research project results in each state-wide consortium meeting; Support 1-3 summer student internships each year, depending upon selection and available funding; Increase the number of community college institutions regularly participating in LaACES by one every two years; Support the HASP program at least through 2018 and partner with the NASA Balloon Program Office to develop an extended HASP program for subsequent years.

2) Encourage aerospace related industries in Louisiana for economic development and diversification. [LOB 1]

Objectives: Develop partnerships with the companies locating at the new Michoud Aerospace Industrial Park; Develop a summer intern program with Louisiana aerospace related STEM industries and support summer interns at these facilities.

3) Promote and contribute to science, technology, engineering, and mathematics precollege education excellence. [LOB 4]

Objectives: Financially support 2-5 middle and/or high school teachers to attend summer workshops/trainings for STEM curriculum development relevant to NASA, such as the Texas Liftoff workshop and Project Lead the Way certifications; Financially support 10-20 middle school teacher participants in the annual Sci-Port Scibotics teacher training program; Provide staff and material support at affiliate university campuses for at least 2 projects/events targeting middle school/high school students over the next three years.

4) Engage and educate the general public in NASA's space exploration projects, benefits and opportunities as well as Louisiana's role in the NASA program. [LOB 3 and 4]

Objectives: Support at least 3 Mobile Astronomy Resource System (MARS) events every year at public or school venues around the state; Foster science center and university collaborations resulting in a yearly proposal to NASA informal education solicitations as available; Increase partnership activities with science and informal learning centers within Louisiana, resulting in 1 additional partnership project per year.

5) Maintain a cooperative, effective and inclusive consortium of Louisiana institutions to promote aerospace related research, education, and economic development. [LOB 1]

Objectives: Improve affiliate participation in consortium meetings, program solicitations and survey responses by 4% each year over the next 3 years; Improve participation of minorities, females, and other diverse groups by 5% per year over the next period; Enhance regular communication with affiliates by establishing a web accessible database of LaSPACE announcements within the first year and investigate new communication technologies; Continue to hold at least one state-wide Consortium Council meeting each year.

C. PROGRAM/PROJECT BENEFITS TO PROGRAM AREAS

In year 2 of our current 3 year cycle, Louisiana Space Grant is successfully supporting projects in all of our major program areas. We have issued 39 subwards across 13 affiliate campuses supporting a wide-reaching array of projects.

One of the most consistent success stories we see across the National Space Grant program is the interconnectivity of our programs across campuses in our states and sometimes across state lines. Over the last five years or so, two young faculty members, Drs. Arden Moore and Mary Caldorera-Moore, at our Louisiana Tech campus have been highly successful PIs on proposals to almost all of the program areas we support (Research Enhancement Awards, Undergraduate Research Awards, LaACES student ballooning, Senior Design). We recently learned that these two faculty members are not only married, but their courtship began over a decade ago when they were both undergraduates at LaTech being supported by NASA Space Grant funding! With PhDs in Mechanical Engineering and Biomedical engineering respectively, Arden and Mary are now establishing strong NASA-related research programs of their own at LaTech and student mentoring is a core component of that development for them both. For example, last year we supported a Senior Design project directed by Arden for the development of an unmanned aerial vehicle constructed entirely of sustainable/recycled components, while this year we are

supporting a Senior Design project directed by Mary to modify and retrofit a commercial 3-d printer to produce variable material hydrogels. Mary and one of her undergraduate researchers, Rachel Hegab, will present the full story of connectivity and growth at the annual spring meeting of the National Space Grant Directors meeting in D.C. in early March 2017. Additionally, Rachel will be presenting a poster of her research at the student poster session during this same meeting.

The scientific ballooning programs for students developed and managed by the Louisiana Space Grant Program continues to flourish at the state and national levels. Piloted in 2003, our Louisiana Aerospace Catalyst Experiences for Students (LaACES) program is seeing record participation across the state this year. In addition to the core team at LSU, we have participating student teams at 6 affiliate campuses (LaTech, LSU-Shreveport, McNeese, Southern University BR, Xavier, & Delgado Community College), and 1 faculty development program at River Parishes Community College. This year's participants were asked to design and build a solar-eclipse related payload. Subsequently, all LaACES student teams participating in this year's program will be competing for additional support to participate in balloon flights in the path of totality for the August 21, 2017 solar eclipse. LSU faculty, staff, and students are participating at a high level in the national solar eclipse ballooning project spearheaded by the Montana Space Grant. Louisiana collaborated with Montana, Colorado, and Minnesota to develop the common payload, to design and test payload and ground station equipment, and to train more than 50 student teams across the country. Part of the previously mentioned testing, included an LSU team participating in the September 2016 HASP flight in New Mexico. As a result of the deep knowledge and experience LSU students have acquired via LaACES, HASP, and the Solar Eclipse project, our students were also awarded a \$200K USIP grant from NASA SMD/OE which is complementing an ongoing NASA EPSCoR Research Project, is intricately linked to the components being developed for the Solar Eclipse project, and is providing a mechanism to train new undergraduates in scientific ballooning.

D. PROGRAM ACCOMPLISHMENTS

- NASA Internships, Fellowships, and Scholarships (NIFS):

LaSPACE supports the NIFS program area via several established sub-programs laid out in our 2015-2018 proposal. For graduate students we have the final phases of the Fellowship Program, which is being discontinued due to financial constraints, and the Graduate Student Research Assistance (GSRA) program, which has been made more robust in light of the closing of the Fellowship program. Our proposal goals for these two programs were to maintain funding for our one active (5th of 5 year) PhD Fellows, and to issue 5 new GSRA awards. We were able to fund 7 new GSRA awards across two campuses (LaTech & LSU).

We have four NIFS programs to support undergraduate students. We supported 0 Interns from Louisiana at NASA Centers in the summer of 2016. We are supporting 6 students via the LaSPACE Undergraduate Research Assistantship (LURA) Program at one campus, and we have awarded 4 Minority Research Scholar (MRS) awards to a faculty/student team at 3 universities (LaTech, ULL, & UNO). Finally, we have maintained our commitment to supporting the exceptional Scholars program directed by Dr. Bagayoko of Southern University and A&M College, Louisiana's largest HBCU. This Scholars subaward supports at least ten traditionally underrepresented STEM undergraduate students annually.

- Higher Education projects:

Our higher education programs, the Louisiana Aerospace Catalyst Experiences for Students (LaACES) and Senior Design, have seen increased participation in recent years. We attribute the latter to our work at increasing visibility of the projects we have supported. We are currently supporting 5 distinct projects at LSU and 1 at LaTech. The former program area has seen growth at both the lead institution, LSU, and around the state due to the integration of student ballooning experiments within other projects. Both our recent SG funded Community College grant and USIP award focused on scientific ballooning programs. Additionally, Louisiana has taken a leading role in support of Montana Space Grant for the National Solar Eclipse Ballooning project, which has directly influenced LaACES participation by affiliates across the state. For this fiscal year, in addition to the robust ballooning program at LSU, we are supporting active LaACES ballooning projects on 6 campuses (LaTech, LSU-Shreveport, McNeese, Southern University BR, Xavier, & Delgado Community College), as well as 1 faculty development focused LaACES program at one of our community colleges (River Parish Community College).

- Research Infrastructure projects:

The comprehensive LaSPACE Research Infrastructure (RI) program has the purpose of 1) supporting emerging early career researchers or new research directions, 2) expanding research involvement at minority institutions and four-year schools, 3) fostering collaborations and seed projects to bring Louisiana scientists into the mainstream of NASA-related research activity, 4) technical training for the next generation aerospace workforce, and 5) engaging local industries and promoting economic development for the state. Specific programs include Research Enhancement Awards (REA), Research Initiation Grants (RIG), and Unsolicited Research Proposals (URP), as well as interactions with aerospace-related industries. Additionally, it should be noted that all of our programs that support undergraduate and graduate students require said students to be actively working on a research project. This provides both the necessary experience for our students, as well as much needed support for faculty researchers.

The REA program, LaSPACE's most robust and longest-running RI program, provides seed funding for an early career researcher, or an established researcher exploring a new project, with an opportunity to develop an idea in preparation for involvement in a larger funded project. Our twenty-seventh REA competition held in the summer of 2016 resulted in the funding of 5 REA projects on 4 different campuses, LSU, LaTech, ULL, and our newest affiliate, LSU Health Sciences Center in Shreveport (LSUHSCS). Dr. Lynn Harrison's project at LSUHSCS is relevant to NASA's Human Exploration and Operations Mission Directorate concern with the effects of space travel on microorganisms that could exist on board space vehicles. Waterborne mycobacteria are relevant as they could be carried on board from Earth and can result in human infection. This will be especially relevant to future NASA programs that require extended time in space. By understanding how mycobacteria alter their growth, gene expression and infection capability under LSMMG, we will enhance our understanding of the fundamental process of mycobacteria infection. This could result in the development of disinfection and drug technologies that will result in a safe environment for humans during extended time in space, and enhance quality of life on Earth.

- Precollege projects:

LaSPACE has established a small but targeted program aimed toward enhancing pre-college education focusing on the training of K-12 in-service teachers with an emphasis on middle school. So far this year we have financially supported five Louisiana middle school teacher's participation in the Summer 2016 Liftoff Workshop offered by Texas Space Grant and Johnson Space Center in Houston, TX. We also supported a project spearheaded by the Associate Chair of the Physics & Astronomy Department at LSU to work with three Louisiana K-12 science teachers to develop and disseminate curriculum targeted at multiple grade levels for safe viewing of the 2017 Solar Eclipse.

- Informal Education projects:

The LaSPACE informal education and public outreach program was developed to provide supplemental learning experiences about NASA projects and science results for the general public, as well as to augment STEM learning in the formal environment. For the last few years, we have been successful in bringing the MARS Truck, or Mobile Astronomy Resource System, to a variety of school-based and general public events. In April of 2016, we participated in Louisiana Earth Day for the second year in a row, and estimate about 1500 visitors passed through our exhibit space. The MARS Truck team also participated in Astronomy Days hosted at two different science museum affiliates, a daytime event on May 7th at the Louisiana Arts & Sciences Museum and an evening event on May 14th at the Highland Road Park Observatory, with respectively 25 and 150 public participants. In addition to our MARS Truck outreach events, we funded a project at Nicholls State University to procure supplies and develop curriculum for public astronomy events near and around campus.

E. PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE GOALS

- Diversity:

LaSPACE has always been an open consortium, offering membership to any organization that shares the consortium's goals and objectives. The LaSPACE network includes 30 affiliates that represent the social and economic diversity across the state. Of the 22 universities and colleges that are part of LaSPACE, 16 (or over 75%) have been designated by the U.S. Department of Education as a Minority Institution or eligible for Title III and Title V programs at least once between 2010 and 2014 (marked by a '*' in the list on page 8 of this report). Included in these numbers are five of the six Historically Black Colleges & Universities (HBCU) in Louisiana identified by the White House in 2015. NCES statistics show a statewide minority enrollment of ~36% in all disciplines. State statistics show that of students enrolled in STEM degree programs 28% are classed as minority and 22% are women. We exceeded these benchmarks the last three years and anticipate achieving comparable participation rates this year. The LaSPACE Council, comprised of institutional representatives from each active affiliate and the 3-person management team at LSU, includes 4 underrepresented minorities and 9 women.

- Minority Serving Institution Collaborations:

Five of the six Minority Serving Institutions (MSIs) in Louisiana, as identified by the White House in 2016, are affiliates of LaSPACE. Dillard University, Grambling State University, Southern University and A&M in Baton Rouge (SUBR), Southern University in New Orleans (SUNO), and Xavier University of Louisiana are all active members of the consortium. Two of the six campuses

participating in this year’s LaACES program are HBCU affiliates, SUBR and Xavier. SUBR continues to be a highly active partner with the long running and extremely successful Space Grant Scholars program via their award winning Timbuktu Academy program run by Dr. Bagayoko. SUNO has no active Space Grant awards this fiscal year, but does hold some EPSCoR funded Subawards and has expressed interested in proposing to our new Scholars modeled after the successes achieved at SUBR. This new program, the HBCU Institutional Scholars (HIS) Program, aims to develop a small focused program to train students on HBCU campuses for research careers via experiences not traditionally found inside the classroom.

- Office of Education Annual Performance Indicators:

- API ED-15-1 6 (Number of NIFS to racially or ethnically underrepresented students, women, and persons with disabilities.)¹
- API ED-15-2 8 (Number of educators.)²
- API ED-15-4 3 (Number of informal education events.)
- API ED-15-5 1675 (Number of K-12 students.)³

¹We have not received any demographic data on our Scholars students at SUBR. We anticipate this number of significantly direct funded students will increase to at least 10 by the time we get all data in. Additionally, we are not counting students supported under our other program areas: Higher Education and Research Infrastructure.

²We supported 3 middle school teachers to participate in a Solar Eclipse curriculum development project and 5 K-12 teachers were funded for Liftoff 2016 in the summer. This number does not reflect the hundreds of educators who attend our public/school-based outreach events nor the numerous college level faculty members we support across all of our programs.

³We do not have precise numbers on attendance at the informal events LaSPACE participates in, but we can say these events combined impacted thousands of South Louisiana residents. We make this conservative estimate based on general attendance numbers issued by event organizers and anecdotal information gathered from our staff at the events.

F. IMPROVEMENTS MADE IN THE PAST YEAR

We have improved our affiliate profile in the Northern part of the state. Louisiana State University at Shreveport, a long-time inactive member of the Louisiana Space Grant Consortium, appointed a new institutional coordinator and we now have a brand new student LaACES team on that campus. We also accepted a new institution into our consortium, Louisiana State University Health Sciences Center, also in Shreveport, and are already funding a Research Enhancement Project to study the effect of space travel on waterborne mycobacteria.

For the last few years, LaSPACE had been holding period teleconferences as conditions merited such meetings. We’ve decided to implement a quarterly teleconference in winter, spring, and summer to supplement our two day in-person statewide meetings in the fall. This should improve communication throughout the consortium and about our programs, as we encourage institutional coordinators to invite additional faculty from their campuses to the phone meetings.

Last fiscal year we created a streamlined based template and individualized guidelines for all of our program solicitations. Early in this fiscal year, we established a solicitation schedule to ensure timely

and routinely issued calls for proposals that aim to accommodate our funding cycle as well as the needs of our campus affiliates.

In an attempt to further improve HBCU participation in Space Grant programs, we developed new program for which HBCU affiliates are exclusively eligible. The LaSPACE HBCU Institutional Scholars (HIS) program is directed at HBCU LaSPACE affiliates to provide support for an institutional program for mentoring undergraduate STEM students who are members of groups that are traditionally underrepresented in science and engineering professions, and engaging them in space/aerospace science and technology research or experiential experiences. The intent of the HIS program is for the institution to develop and maintain a coordinated program to attract, engage, and retain HBCU students in STEM fields providing training not normally obtained in the classroom such as technical presentation skills, mentoring to guide the student through their academic program, providing experiences relevant to aerospace / space sciences, and exposing the students to alternate NASA related careers. We released the HIS RFP on January 9, 2017 with a proposal due date of March 8, 2017. The inaugural HIS projects should commence during FY17 around the middle of the year.

G. CURRENT AND PROJECTED CHALLENGES

An ongoing challenge for managing the Louisiana Space Grant and NASA EPSCoR programs has been the increasing demand for proposals and reports. Last year's single augmentation proposal and the steadiness of reporting requirements (content and schedule) for APDs and OEPM has done a lot to alleviate that challenge. Still the LaSPACE office is understaffed without a dedicated student worker, program coordinator, informal education coordinator, or Assistant Director. We intend to increase our staffing levels during the next fiscal year to fill some of these gaps.

The tradition of budget shortfalls in the state has resulted in massive cuts to higher education. Our smaller affiliates, especially community colleges and HBCU campuses struggle to generate match funds for our programs. The ongoing match from the Louisiana Board of Regents and the steady support of our lead institution, LSU, allows us to offset a good bit of that burden.

H. PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

Consortium members (see list below) include colleges/universities [Research Intensive (RIU); Research Active (RAU); Four year institutions (4YI); Community Colleges (CC), HBCU's], business/industry partners (B/I), state education boards (Ed), and nonprofit organizations (NPO), structured as Active Members (AM), Inactive Members (IM), and New Members (NM), the latter are members that signed on within the last 6 months. Affiliates designated by the U.S. Department of Education as a Minority Institution or eligible for Title III and Title V programs are marked with an asterisk ("*"). Each member has an institutional representative/coordinator. When that position becomes vacant, the institution becomes Inactive until a new representative is appointed. As an open consortium, joining LaSPACE is simple, requiring a letter of interest submitted to LaSPACE by an authorized institutional representative, which designates an institutional coordinator. Overall, it is the Institutional Coordinators that have the responsibility for recruiting students on their campuses, publicizing LaSPACE opportunities, and building an aerospace component to the campus activities, utilizing methods that work locally.

List of Louisiana Space Grant Consortium Members (Alphabetical)

Baton Rouge Community College (BRCC): AM, NM, CC,*

Delgado Community College (DCC): AM, NM, CC,*

Dillard University (Dillard): AM, HBCU, 4YI,*

EBR Recreation & Park Commission: Highland Road Park Observatory: AM, NPO
 Gordon A. Cain Center for STEM Literacy: AM, NPO
 Grambling State University (GSU): AM, HBCU, 4YI,*
 Jacobs Technology, Inc. at Michoud (Jacobs): AM, B/I
 Louisiana Arts and Science Museum / Pennington Planetarium (LASM): AM, NPO
 Louisiana Board of Elementary & Secondary Education (BESE): AM, Ed
 Louisiana Board of Regents (BOR) (Co-founding Institution): AM, Ed
 Louisiana Business and Technology Center (LBTC): AM, B/I
 Louisiana State University and A&M College (LSU) (Co-founding & Lead Institution): AM, RIU
 Louisiana State University Health Sciences Center in Shreveport (LSUHSC-S): NM, RAU
 Louisiana State University of Shreveport (LSU-S): AM, 4YI,*
 Louisiana State University Agricultural Center (LSU-Ag): AM, RIU
 Louisiana Tech University (LaTech): AM, RAU
 Loyola University (Loyola): AM, 4YI
 McNeese State University (McNeese): AM, 4YI,*
 Nicholls State University (Nicholls): AM, RAU,*
 Northwestern State University of Louisiana (NWSU): AM, 4YI,*
 River Parishes Community College (RPCC): AM, NM, CC,*
 SciPort Louisiana's Science Center (SciPort): AM, NPO
 Southeastern Louisiana University (SELU): AM, 4YI,*
 Southern University and A & M College (SUBR) (Co-founding Institution): AM, HBCU, RAU,*
 Southern University of New Orleans (SUNO): AM, HBCU, 4YI,*
 Tulane University (Tulane): AM, RIU
 University of Louisiana at Lafayette (ULL): AM, RAU,*
 University of Louisiana at Monroe (ULM): AM, 4YI,*
 University of New Orleans (UNO): AM, RAU,*
 Xavier University of Louisiana (Xavier): AM, HBCU, RAU,*

The Council (comprised of all institutional reps and the central management team at LSU) is the primary oversight and advisory board for LaSPACE. The Council meets annually for a formal two-day meeting during the fall semester at one of our affiliate's campuses, and communicates via teleconference and email between meetings. General administration and management is the responsibility of the LaSPACE Management Team at LSU.