Illinois Space Grant Consortium
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Director: Dr. Philippe H. Geubelle
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Consortium URL: www.ae.illinois.edu/ISGC
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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 Illinois Space Grant Consortium is a Designated Consortium funded at a level of $575,000 for fiscal year 2013.

PROGRAM GOALS

2013 ISGC Goals and Objectives

- Diversity in Fellowship/Scholarship, Research Infrastructure and Higher Education program areas.
  - Reach the underrepresented minority percentage (currently 29%)
  - Reach the ISGC target of 40% for female awards

- Fellowships and scholarships
  - Provide scholarships and fellowships to students at ISGC academic institutions.
  - Receive at least 90 applicants for fellowships/scholarships.
  - Ninety percent of scholarship recipients will enter graduate school or STEM employment at their "next educational step" (66% employment specifically at NASA, aerospace companies, universities or other educational institutions)

- Undergraduate research programs/assistantships in aerospace engineering and science
  - There will be six undergraduate research programs at ISGC academic institutions
  - Ninety percent of undergraduate research program participants will enter graduate school or STEM employment at their "next educational step" (66% employment specifically at NASA, aerospace companies, universities or other educational institutions).

- Seed grants
  - At least two out of the awardees will receive additional research funding
  - At least four of the grants will be awarded to women or underrepresented minorities

- External internships/Academies
  - At least eight NASA Center summer interns/Academy participants from ISGC academic institutions will be supported during summer 2013
  - Will establish internship opportunities with at least one of the ISGC industrial/national lab partners

- Educational activities outside of classroom
  - Support for at least five projects in a variety of areas: aeronautics, rocketry, and spacecraft

- Higher education STEM courses
  - Support at least two course development activities that expand the STEM knowledge
  - Support at least two new or revised courses that incorporates hands-on activities

- Teacher training
  - Offer standards-based teacher training in geographically diverse areas of the consortium

- Informal education
  - Offer five informal education programs in both Chicago and Rockford that will reach at least 100,000 individuals
  - At least one informal education program will focus on rural Illinois communities
  - At least one informal education program will involve collaboration with a community college

PROGRAM/PROJECT BENEFIT TO OUTCOME (1,2, & 3)

- Outcome 1: ISGC exceeded its target percentage for the participation of women and within target range for the participation of underrepresented minorities to the new target level in ISGC Scholarship/Fellowship, Research Infrastructure and Higher Education programs. Females – 43.9%; minorities – 27.6%.
- Outcome 1: ISGC continues to participate in the Great Midwestern Region Space Grant rocket competition. Four undergraduate student teams from Illinois participated in the competition on April 26-27, 2013.
- Outcome 2: Twenty-two middle-school STEM teachers from the Chicago Public Schools completed their Master of Science in Science Education degree at DePaul in FY 2013. This is three times more than in FY 2012.

PROGRAM ACCOMPLISHMENTS

- *Diversity in Fellowship/Scholarship, Research Infrastructure and Higher Education program areas*
  - Direct participation by underrepresented minority students was 32.1%, exceeding the target of 29%.
  - Direct participation by females was 50%, exceeding the target of 40%.
- *Fellowships and scholarships*
  - Applications were received from all active academic affiliates in ISGC.
  - Received 94 fellowship and scholarship applications, making the selection process very competitive.
- *Undergraduate research programs/assistantships in aerospace engineering and science*
  - Support was given to (7) undergraduate research programs at (6) ISGC academic institutions; one of the programs was targeted at underrepresented minority students.
  - Two of the undergrad research students were selected to present their research posters at the National Space Grant Directors Meeting in Charleston, SC, Oct. 2013.
  - 21 papers (1 published; 18 presented; 2 pending) resulted from projects related to undergraduate research program
  - One proposal, totaling $388K was submitted. Selection pending
- *Seed grants*
  - Seven seed grants were awarded to junior faculty/researchers.
  - Seven proposals based on the ISGC seed grant work have been submitted ($2,076,000). So far, three are pending and four rejected.
  - Four of the seven seed grants were awarded to women or underrepresented minorities.
- *External internships/Academies*
  - Eight students from ISGC academic institutions were supported to attend NASA Center Academies/internships. Three of the students were female.
- *Educational activities outside of classroom*
  - Supported (7) hands-on projects: design/build fly remote control aircraft at UIUC; USLI rocket team; CubeSat/CubeSail; NASA Lunabotics Mining Competition team; students building full-size aircraft; SAE Formula Electric car and (4) teams to participate in Great Midwestern Regional Rocket Competition organized by the Wisconsin Space Grant.
- *Higher education STEM courses/curricula*
  - CSU is developing a set of interactive online curriculum modules, which will be used locally and nationally by introductory astronomy and cosmology instructors. The technology being developed by CSU and by the publisher will serve as a model for transforming introductory science courses from primarily lecture- and book-based to a more engaging format.
  - Continuing to support hands-on freshman design course at UIUC. This includes both an aircraft and high-powered rocketry sections.

- AE 498 UAV at UIUC is a recently developed, project based course for upper level students that is centered on the aerodynamics, stability/control, propulsion, and manufacturing methods for unmanned aerial vehicles.
- Expansion of the hands-on components of an aerospace decision algorithms course. Laboratory implementation using a hardware platform (including a quadrotor) is an essential part of the curriculum.

Outcome 2:

- *Teacher training*
  - ISGC continues its support of DePaul's Master of Science in Science Education (MSSE) degree program for Chicago Public School middle-school teachers. Twenty-two teachers completed their master's degrees this fiscal year. Fourteen new teachers in the program.
  - The Discovery Center Museum in Rockford offered ten teacher workshops (another will take place in late March). A total of 55, K-12 teachers attended the workshops. The workshops trained teachers on astronomy and rocketry, including activities to be used in the classroom and in afterschool programs.

Outcome 3:

- *Informal education*
  - Five informal education programs were funded with ISGC 2013 base grant funds.
  - In 2011, ISGC funding led to a 38% increase in participants in the Astronomy Conversations program at Adler Planetarium (more than 35,000 attendees total.) With funding in 2013, the number of participants is not at approximately 40,000.
  - One undergraduate student and more than 100 YES volunteers, age 12-18, gained valuable experience learning about STEM topics, especially aerospace related subjects, as they were taught how to lead activities and demonstrate exhibits. They also learned how to engage visitors, developing confidence and public speaking skills in the process. The YES volunteers applied this knowledge with visitors at community venues with the Outreach to Space exhibits, as well as in the museum environment where they conducted science cart activities with the public, reaching more than 51,000 people.
  - Discover Engineering (a celebration of National Engineers Week) introduced and excited children about the world of engineering. Various opportunities in the field of engineering were showcased by 20 different organizations, including UTC Aerospace Systems, Rock Valley College (a community college) and the public library in Rockford. New this year and an instant favorite was the Universal Hovercraft booth where children could ride in a hovercraft. They also made a simulated miniature hovercraft to take home. A total of 1,221 people attended including 107 Scouts who participated in breakout sessions to earn various engineering related badges.
  - The Bradley University Chemistry Club received ISGC funding for the first time. Faculty members and undergraduate students visit schools in the Peoria area (with predominantly minority student populations.) Through demonstrations, hands-on

activities and resource handouts, Bradley students introduced elementary students to chemistry and physics principles related to space. So far in FY 2013, the program reached 319 participants.

- A new program was started at Adler, "Scientists Supporting Clergy in Their Roles as Informal Science Educators." The primary goal of this project was to provide scientific resources for clergy who have expressed interest in working with scientists to raise the level of public science literacy by including scientific themes into church programs. Thirty clergy attended the February 2014 symposium. Among the speakers was Br. Guy Consolmagno of the Vatican Observatory.

PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES

- **Student Data and Longitudinal Tracking:** Total awards = 98; Fellowship/Scholarship = 28; Research Infrastructure (undergrad research programs and seed grants) = 51; Higher Education = 19. Of the students funded with 2013 base grant funds, more than 90% are still enrolled in current degree programs.
- **Minority-Serving Institution Collaborations:** Chicago State University continues to be an active member of ISGC. In 2013, participation focused on one research seed grants (including the participation of an undergraduate researcher), a higher education project to develop a cosmology curriculum (including the participation of three undergraduate researchers) and scholarships.
- **NASA Education Priorities:**
  - *Hands-on student experiences* – ISCG supported 51 students in seven undergraduate research programs and four research seed grants. Eight ISGC students were selected for NASA intern/Academy research experiences. ISGC funded seven extracurricular projects at UIUC: design/build fly remote control aircraft at UIUC; USLI rocket team; CubeSat/CubeSail; NASA Lunabotics Mining Competition team; students building full-size aircraft; SAE Formula Electric car; a team participating in NASA's Lunabotics competition; USLI rocket competition team and four teams in the Great Midwestern Region Space Grant rocket competition.
  - *Diversity of institutions, faculty, and student participants* – Eleven of our 12 consortium institutions are actively involved in ISGC. This group includes urban and rural institutions scattered throughout the state. Ten of the 22 proposal PIs were women. Direct participation by underrepresented minority students was 27.6%. Direct participation by female students was 43.9%, exceeding the target of 40%.
  - *Middle school teacher training* – Three teacher programs were funded with base grant funds. The Discovery Center Museum programs involved a series of workshops that included middle school teachers. The program provided training to teachers on weather, astronomy and rocketry, including activities to be used in the classroom and in afterschool programs. Another program that ISGC continued to support was the Master of Science of Science Education (MSSE)

degree at DePaul. MSSE includes both traditional coursework as well as NASA materials that will be used in the classroom. A new initiative from the Adler Planetarium, Space Science Educator Community of Practice, will include formal and informal educators as well as researchers who share a passion for space science education. This program is in conjunction with the previously supported Educators Open House.

- *Community colleges* - Chicago State University continues to work with Harold Washington College (one of the City Colleges of Chicago) in astronomy education research. The Discovery Center Museum works with Rock Valley College during its Discover Engineering program.
- *Aeronautics research* –Nine undergraduate research projects at ISGC affiliates were aeronautics-related.
- *Research support for early career faculty* – ISGC continued to strongly support its research seed grant program for early career faculty and researchers at smaller institutions. Seven faculty were selected for base grant funding. Each selected researcher receives $6,000 to conduct research in areas of interest to NASA and gather data that will lead to a proposal(s) for further funding.

IMPROVEMENTS MADE IN THE PAST YEAR

- ISGC exceeded its target percentage (43.9%) for the participation of women in ISGC Scholarship/Fellowship, Research Infrastructure and Higher Education programs.
- As the ISGC continued to receive only base grant funding in FY2013, an adjustment in the budget was made in late 2013. 29.8% of the money allocated for administrative costs was reassigned to fund programs directly related to students. This lesser amount of administrative funding will continue in FY2014.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

University of Illinois at Urbana-Champaign
PhD-granting research university
Lead institution for ISGC
Public, land-grant institution
ISGC activities: management; undergraduate research; scholarships and fellowships; seed grants; course development; design/build/fly student projects

Illinois Institute of Technology
PhD-granting research university
Private university
ISGC activities: undergraduate research; scholarships and fellowships; seed grants; course development

Northwestern University

PhD-granting research university
Private university
ISGC activities: undergraduate research; scholarships and fellowships; seed grants; course development, teacher training

The University of Chicago
PhD granting research university
Private university
ISGC activities: undergraduate research; scholarships and fellowships; seed grants;

Southern Illinois University Edwardsville
Master's-granting university (professional degrees in medical fields)
Public institution
ISGC activities: seed grants; scholarships and fellowships; course development

University of Illinois at Chicago
PhD granting research university
Public institution
ISGC activities: undergraduate research; scholarships and fellowships; seed grants

DePaul University, Chicago
Master's granting university
Private institution
Eighth-largest private, not-for-profit university in the nation
ISGC activities: scholarships; K-12 teacher training; undergraduate research; seed grants

Bradley University, Peoria
Master's granting university (one PhD program)
Private Institution
ISGC activities: scholarships; seed grants; K-12 teacher training

Chicago State University, Chicago
Master's granting university
Public institution
Recognized as a Minority Serving Institution
ISGC activities: undergraduate research; scholarships; seed grants; course development

Western Illinois University, Macomb (will focus on reactivation in 2012)
Master's granting university
Public institution
ISGC activities: K-12 teacher training; scholarships

Adler Planetarium & Astronomy Museum, Chicago
Planetarium, education and research institution
Not-for-profit

ISGC activities: seed grants; K-12 teacher training; higher education programs; informal education programs

Discovery Center Museum, Rockford
Educational and recreational institution
Not-for-profit
ISGC activities: K-12 teacher training; informal education programs

The National Space Grant Office requires two annual reports, the Annual Performance Data Report (APD) and the Office of Education Performance Measurement System (OEPM) report. The former is primarily narrative and the latter data intensive. Because the reporting timeline cycles are different, data in the two reports may not necessarily agree at the time of report submission. OEPM data are used for official reporting.