

Delaware Space Grant Consortium
University of Delaware
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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 **DE** Consortium is a Program Grant and Capability Enhancement Consortium funded at a level of **\$590,000** for fiscal year 2009.

PROGRAM GOALS

Utilize NASA funds to serve students and teachers in the State of Delaware in a variety of educational and training projects in areas which are related to STEM-G. At the college level, provide fellowships and scholarships to students attending 2-year and 4-year colleges throughout the State and to aid in professional development of STEM-G related educators. Enhance research opportunities on and off-campus, during the academic year and summer. Recruit and provide support for the education and training of professionals especially women, underrepresented minorities, and persons with disabilities for careers in fields which will meet NASA's needs in the 21st century.

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

(1) For DESGC, a major success of FY08 has to do with the number of Graduate Fellows who were supported by DESGC. In all, an **unprecedented number of 11 fully-funded graduate students** in Delaware received Fellowship support in FY09. Moreover, the full-year stipends are at a higher level than DESGC has ever offered before.

(2) The success of the Graduate Fellowship component of DESGC in FY09 is due in part to our success in obtaining cash matching funds (\$10,500) for the first time from the Bartol Research Foundation.

(3) A second success of the Graduate Fellow program in FY09 has to do with diversity: DESGC has been successful in continuing to fund **two** Graduate Fellows at Delaware's HBCU (Delaware State University [DSU]) in FY09.

(4) DESGC in FY09 continued to support participation of Delaware's two-year Technical and Community College (DTCC) at the Rock-On Workshop at NASA/Wallops.

(5) As a result of the large number of DESGC-supported research activities in FY09 among graduate and undergraduate students, the DESGC Annual Research Symposium, held in November 2009, was very well attended, with **17 poster and 7 oral presentations**.

PROGRAM ACCOMPLISHMENTS

Notation: *in evaluating our metrics in what follows, we write a plus sign (+) if the goal was met. If the goal was exceeded, we write two plus signs (++). If the goal was not met, we write a minus (-). At the end of this document, we provide a sum total of plusses and minuses to determine an overall "score" for how well we met the goals which we set back in May 2009.*

Administration A major accomplishment for DESGC in FY09 was the hiring of a new Program Coordinator. The previous Coordinator, who had served 15 years, stepped down in summer 2009, and a search for a replacement was initiated. In our FY09 proposal, the hiring of a replacement was mentioned as a key goal for FY09. **We met this goal.** This led to the hiring of Rebecca George in September 2009, in the first month of DESGC's FY09 operations. +

Outcome 1:

Here, we report on (1) Graduate Fellowships, (2) Undergraduate Research, and (3) Research Infrastructure.

(1) Graduate Fellowships

Metric: In our FY09 proposal, DESGC had set as a **goal**, full funding for 7.5 graduate fellows. **We exceeded this goal:** in FY09 DESGC funded 11 graduate fellows in response to our call for competitive DESGC fellowships. ++

Metric (Diversity): In our FY09 proposal, the DESGC goal was to retain at least one graduate student at Delaware's HBCU (DSU) supported by DESGC graduate fellowships. **We exceeded this goal:** DESGC in FY09 funded two grad fellows at DSU. ++

Progress towards degree for DESGC FY09 graduate fellowship awardees:

1. Steven R. Rock – Optics, Delaware State University.

Scheduled to defend PhD dissertation summer 2010. Research work deals with “Laser Induced breakdown Spectroscopy” (LIBS): now applying to NASA/GSFC and NASA/LaRC for postdoc positions.

2. Alan Stottlemeyer –UD Chem. Engineering

Defended PhD dissertation, June 29, 2010 on the topic “Tungsten Monocarbide (WC) as an Alternative Anode Electrocatalyst in Proton Exchange Membrane Fuel Cells”. Accepted a position with Dow Chemical Company in Michigan as Senior Engineer.

3. Douglas J. Rodgers – UD Physics and Astronomy.

Finished up his PhD degree on the topic “Electron Plasma Experiment on Models of a 2-D fluid” defended his dissertation on August 18, 2010

4. David A. Johnson UD Chem Engineering

Defending PhD dissertation August 31, 2010 on the topic “Development of a blood flow model”, with applications to astronaut health during long-exposure to weightlessness. Accepted a position with University of Delaware in the Chemical Engineering department working directly with the Chair on special projects.

5. John D. Shaw – UD Physics and Astronomy.

In final stages of PhD: all of the necessary observations of low mass stars in a young association have been obtained at telescopes in Chile, and analysis of the data is well underway.

6. Dana Boltuch – UD Physics and Astronomy

Progressing towards PhD using the instrument “Very Energetic Radiation Imaging Telescope Array System” (VERITAS) to observe high energy photons from supernova remnants. Presented an oral progress report at DESGC Symposium in November 2009.

7. Rachel Bernstein – UD Geography

In early stages of PhD research on “Sea Ice Volume Transport in the Southern Ocean”: presented an oral progress report at DESGC fall Symposium in November 2009.

8. Josh Wickman - UD Physics and Astronomy

Continues to work on PhD research on “Cosmic inflation and particle physics”: presented an oral progress report at DESGC Symposium in November 2009.

9. John Meyer - UD Physics and Astronomy

In early stages of PhD research on the topic of “Computer modeling of magnetic reconnection”.

10. Ashley Satinsky – UD Geography

In early phase of PhD study on “Management of soils to mitigate global warming”: had to take family sick leave for 3 months in fall 2009.

11. Michael D. Meadows - Physics and Pre-Engineering, Delaware State University. Continues to work on PhD research on “Fluorescence Correlation Spectroscopy” in the lab of Dr Chandra Subanayagam: presented a poster progress report at DESGC Symposium in November 2009.

(2) Undergraduate Summer Research

Metric: DESGC support of *summer research on the UD campus:* in our FY09 proposal, our goal was to offer DESGC support to at least 9 summer research students at UD. **We did not meet this goal:** by the time summer 2010 arrived (i.e. towards the end of FY09 funding), there were enough funds for only 4 summer researchers at UD. -

Metric: *Academy Program at NASA/Goddard Space Flight Center.* In FY09, we proposed that DESGC would support one student in an Academy program at NASA/GSFC. **We exceeded this goal:** 2 students are funded in summer 2010 (i.e. FY09) at NASA/GSFC. ++

Metric: *diversity at NASA/GSFC.* In our FY09 proposal, we had no plans for DESGC to support a disabled student at GSFC. The disabled student metric at NASA/GSFC was zero. **We exceeded this goal:** 1 hearing-disabled student has been funded in summer 2010 (i.e. FY09) at NASA/GSFC. ++

Metric: In our FY09 proposal, the goal was to financially support at least one Delaware student in undergraduate summer research at NASA/Langley. **We did not meet this goal.** -

Metric: In our FY09 proposal, the metric for DESGC support of summer student researchers at the Johns Hopkins Applied Physics Lab was zero. **We exceeded this goal:** DESGC has supported on summer student researcher at JHU/APL in FY09. ++

Metric: *affiliate campuses in PA.* In order to preserve more DESGC funding for summer research students in the State of Delaware, our goal in FY09 was to limit our student internships at our affiliates in PA to 2. **We satisfied this goal.** +

(3) Research Infrastructure

Three components of Research Infrastructure (RI) were funded in FY09, in (a) Marine Studies (at University of Delaware Newark Campus), (b) Applied Optics Center, (at Delaware State University), and (c) Precision Agriculture (at the Univ of Delaware Georgetown campus). Also discussed in this section is (d) the process of strengthening our research links with NASA centers and (e) strengthening research links with industry.

(a) College of Marine Studies at UD-Center for Remote Sensing Research Infrastructure Project

Under the leadership of Dr Xiao-Hai Yan, the general goals of this RI project are: (1) closely align with the goals of NASA's interests in remote sensing and earth sciences, (2) focus on building the core strength needed to develop competitive research and technology, (3) emphasize interdisciplinary research, and training of postdocs, graduate and undergraduate students for future aerospace related workforce, in particular, contribute to the development of the Science, Technology, Engineering and Mathematics (STEM) workforce for NASA, and (4) to promote partnerships between University scientists, NASA Scientists, the private sector, small business and international counterparts to enhance research excellence.

Metric for Research Infrastructure (a). The *metric* we use for measuring success is how much extra funding is obtained as a result of the seed-funding which DESGC provides. In FY09, DESGC provided \$20,000 to Marine & Earth Studies at UD for support of their Remote Sensing Lab. In FY09, Dr Yan and his group received \$250,000 in funding from NASA/EPSCoR Research for their work on Critical Zone Research: this is their second year of a 3-year grant totaling \$750,000. **This metric was well satisfied. +**

Metric (Diversity): From the current *baseline* of 0 Delaware State University students in training at the Center for Remote Sensing, the goal in FY09 is for the Center to enroll and train one undergraduate student from Delaware State. **This goal was not met. -**

(b) Delaware State University: Applied Optics Center (DSU/AOC)

The research group at Delaware State University, under the leadership of Dr Nouredine Melikechi (Chair of the Physics Dept) has been pursuing research on the characterization of various solid and liquid organic samples. One of the main goals is to develop optical techniques that can provide rapidly the elemental composition of various liquid and solid samples. To do this, we designed and assembled an experimental Laser Induced Breakdown Spectroscopy (LIBS) set up. This set up provides LIBS spectra which can be analyzed to obtain qualitative and quantitative elemental composition of the samples. The LIBS technique is used by NASA in its plans for its Mars Science Lander, to sample rocks remotely on Mars surface

Thanks to NASA Space Grant funding, AOC at DSU has developed a LIBS library of pure elemental spectra. Our goal is that this library will help in the identification of emission lines from samples of unknown composition

Metric for Research Infrastructure (b): The *metric* we use for measuring success is how much extra funding is obtained as a result of the seed-funding which DESGC provides. In FY09, DESGC provided \$25,000 to DSU/AOC. In FY09, Dr Melikechi and his group received \$5,000,000 in funding from NASA to establish a University Research center in Applied Optics. **This metric was well satisfied. +**

Metric for undergrad student support: Some funding was meant to support 1-2 undergrad students in the Applied Optics lab, if suitable candidates could be identified. **This goal was not met. -**

(c) College of Agriculture UD Georgetown campus: Remote sensing and precision farming.

As a new start in FY09, DESGC proposed to provide Research Infrastructure Development funding for Dr Susan White-Hansen, GIS/Precision Agriculture Specialist at the Agriculture Research/Education campus of the University of Delaware in Georgetown DE. No Space Grant funds had previously been provided to anyone on the Georgetown campus of UD. Dr White-Hansen has published papers on NASA-related research on precision farming. In FY09, DESGC proposed to provide seed-grant funding for Dr White-Hansen to establish a research program in southern Delaware.

Metric for research Infrastructure (c): establish for the first time DESGC funding for precision farming studies at the southernmost campus of UD. **We met this goal,** and Dr White-Hansen attended the DESGC fall symposium for the first time in Nov. 2009. +

(d) Strengthening links with NASA Centers

Metric (Goddard): In our FY09 proposal, we proposed to support at least one DESGC student at GSFC. **We exceeded this goal:** two DESGC students were supported at GSFC in FY09. ++

Metric (Langley): The goal in FY09 was to have at least one undergrad summer researcher from DE work at Langley. **We did not meet this goal.** -

(e) Strengthening research links with Industry

Metric (ILC Dover): in the FY09 proposal, we had hoped to have one DESGC student work at ILC Dover. **This goal was not met:** ILC Dover was at first interested in a UD student, but subsequently changed its policy and did not accept the student. -

Outcome 2: Higher Education

(a) DESGC Graduate Fellow in Teacher Training in Geography.

Metric: In our FY09 proposal, our goal was to provide funding to a graduate student in UD Geography Dept to expand teaching resources (specifically, satellite imagery) for DE classroom teachers in support of DE geography standards. **We satisfied this metric:** Alison Rothgeb, with advisement from her adviser (also the DE State Climatologist) Dr David Legates, was supported with DESGC higher-ed funding for this task. +

(b) DESGC funding for participants at rocket launch "Rock-on" from NASA/Wallops.

Metric: In our FY09 proposal, our goal was to provide funding to 3 participants from Delaware's two-year Community College system (DTCC), including one faculty member and two undergraduate students. **We did not fully satisfy this metric:** the number of participants funded by DESGC in FY09 at Rock-On was 2, one faculty member and one undergraduate student. –

The undergraduate student who attended Rock-On, Andrew Barrett (African-American), presented an oral report about his experiences at Wallops at the DESGC fall Symposium in November 2009.

(c) Undergraduate Tuition Scholarships.

Metric: The goal in our FY09 DESGC proposal was to spend a total of \$36K for 10 awardees, including at least one student at our newest affiliate, Wesley College. **We exceeded this metric by a significant margin:** using some left-over funds from earlier years, DESGC in FY09 was able to provide Undergrad Tuition Scholarships amounted to a total of \$49K for 17 students. ++

Of the 17 awardees, two were from Wesley College: **we exceeded our metric for Wesley College.** ++

Metric (Diversity, state-wide): Our goal in DESGC for FY09 was to support at least 2 African-Americans in order to exceed the nces.ed.gov statistic for Delaware. **We exceeded this metric:** in FY09, we supported 3 African-Americans as undergrad tuition scholars. ++

Metric (UD Diversity): Our DESGC goal for FY09 was to continue to support at least one African-American tuition scholar at UD. **We satisfied this metric:** DESGC supported Jachin Spenser as an undergrad tuition scholar, and he was highlighted in the Director's report to SG Program Manager De Troye. +

Metric (DTCC Diversity): Our 2-year affiliate Delaware Technical and Community College (DTCC), although not officially an MSI, includes a more representative population of underrepresented minorities among the student body on its State-wide campuses than UD. In FY09, the DESGC goal was to increase the number of African Americans supported with undergraduate tuition scholarships at DTCC to at least 1. **We satisfied this metric.** +

Metric (DSU Diversity): The goal for DESGC in FY09 was to have at least 1 undergrad tuition scholar at Delaware's HBCU. **We satisfied this metric.** +

Metric (Wilmington University [WU] Diversity): The DESGC goal in FY09 was to maintain at least 2 WU students as undergrad tuition scholars. **We exceeded this metric:** DESGC funded 4 WU undergrad tuition scholars in FY09. ++

Precollege Programs

DESGC Programs which are aimed at professional development of teachers are run by (1) Dr Stephanie Wright (founder and CEO of the Delaware Aerospace Educational Foundation [DASEF]) and (2) Prof. Harry Shipman (Annie Jump Cannon Professor of Astrophysics, University of Delaware).

(1) Dr Stephanie Wright (DASEF)

Dr Wright has for some years been offering standards-based Professional Development programs to Delaware teachers in conjunction with information and resource distribution. The Statewide In-service Workshops for Teachers which are run by Dr Wright include the following topics: Goddard Space Flight Center Aerospace Specialists and Scientists, Focus Day/days at different sites: Goddard Space Flight Center, Environmental Outpost, Wallops Island, Kennedy Space Center, specific content requested by educators, mentoring educators during the summer, and attending various conferences.

Metric: Prior to FY08, the baseline as regards quantitative information provided to DESGC concerning how the teachers benefitted from these activities was precisely zero. In the DESGC FY09 proposal, in order to develop metrics for evaluating the workshops, Dr Wright proposed to administer an evaluation questionnaire to all attendees at the conclusion of each workshop. The results of the surveys were to be provided in a timely manner to the DESGC Director. **This goal has been accomplished.** +

Specifically, Dr Wright developed the following questions which have to be answered by all attendees at her FY09 events:

What grade level do you teach?

How long have you taught?

What academic degree do you have?

Number of students taught?

Kind of school: Rural-City-Suburban?

How will this workshop benefit your classroom instruction?

Please explain how you will use NASA materials that you received in your classroom.

Please comment on how this workshop aligns with the goals of STEM education and state standards.

Here, we summarize some of the statistical information which can be gleaned from the questionnaires provided by Dr Wright to the DESGC Director following six events which she conducted in FY09:

- (1) At the Educator workshop “The Universe beyond your eyes” (10/9/2009), 14 attendees responded: grade levels represented ranged from 3rd to 12th, with teaching experience ranging from 5 to 34 years. Degree levels ranged from BA/BS/BSEd to MA/MEd. Numbers of students taught ranged from 18 to 200.
- (2) At the session “Earth Systems” (10/21/2009), 3 attendees responded from Grades 3 and 4, with 7-27 years of experience, 16-21 students in class, and degrees of BS/BA+45.
- (3) At the session “Lunar and meteorite Certification” (10/27/2009), 9 attendees responded from Grades 3-8, with 5-35 years of experience, 16-200 students in class, and degrees ranging from BA/BS/BS+45 to MS/MS+60.

- (4) Educator Workshop “Educators’ eyes on the skies” (2/23/2010), including looking at the Moon thru the telescope. 12 attendees responded from grades 4 thru 12, with 3 to 36 years of experience, 12-123 students in class (plus one class with 9 special ed students), and degrees ranging from BA/BS to MA+45 to 2 Masters to Dr PhysEd.
- (5) Educator workshop “Earth systems” (5/17/2010). 7 attendees responded from grades K thru 6, with 5 to 30 years of experience, 16-150 students in class, and degrees ranging from BA/BS/BSEd/BS+30 to MA/MSEd/MA+45.
- (6) In the category of Teacher Training, Dr Wright invites teachers to attend her Delaware Aerospace Academies, where students from grades 1-10 participate during the summer weeks in STEM learning activities. Some academies are day programs only, while others (for older students) are residential, involving 5 nights of stayover at the University of Delaware. Some sessions are held at UD in Newark, while others are held at DASEF’s Environmental Outpost in Smyrna DE. In the various academies, teachers participate in cooperative mentoring of the students. Following the sessions of summer 2010, 22 teacher attendees responded from Grades 2-12, with 1-25 years of teaching experience, 22-320 students in class (plus one class of 15 students in special ed), and degrees ranging from Assoc to BA/BS+27/BM to MA/MS/MCE/ScM/MA+45.

As regards the free-hand comments which were provided by the attendees, many ran on to 5-6 lines, including positive comments about how the material will “teach the children to conserve, recycle, and respect their environment”, “will introduce the children to global monitoring”.

The questionnaires which have been returned by Dr Wright to the DESGC Director during FY09 provide, for the first time, insight and information which is detailed, broad, and in-depth, concerning the teachers who are taking advantage of the many DESGC-sponsored programs offered by Dr Wright. The number of pre-college students in DE who now have access, through their DASEF-trained teachers, to NASA-related materials is at least 1,200 (using the lower limits in the ranges quoted above), and could be as large as 14,000 (using the upper limits).

(2) Prof. Harry Shipman (UD)

In the DESGC FY09 proposal, Dr Shipman proposed to hold a “Train the Trainer” workshop on bridging the gap between math and science in K-12 education in the state of Delaware. An organization which has been meeting for six years, called MASST (=Math and Science Specialist Team), was to serve as the organizational home for this workshop. **This goal was accomplished.** +

The workshop was held in Dover DE June 29- July 1, 2009. Teams of people from the various school districts around the state were invited, with a mix of teachers, curriculum preparers, and building principals. The most important qualification for a team was that they would be people who are willing to work together now and in the future. The program for the workshop was designed under the guidance of Kelli Martin, who is the State Science Curriculum Supervisor in Delaware. Dr Shipman reported on the outcome

of the workshop at the DESGC fall Symposium, in November 2009: included in his report were evaluations from participants. As a result of the workshop, Dr Shipman will serve on a thesis committee of one of the participants who is planning to do graduate work on the topic.

Outcome 3:

The NASA Space Grant program is run out of the office of **Higher Education**. A separate office at NASA handles Informal Education. Strong statements have been made at national SG meetings by NASA/SG Manager Diane DeTroye concerning the use of Space Grant funds for activities which do *not* fall into the category of **Higher Education**. In particular, certain activities involving K-12 students and the public would be better classified as falling under the area which NASA classifies as “Informal Education”. The funds which are allocated by NASA for “Informal Education” are distinct from the “Higher Education” funds (which include Space Grant). Because of these statements from SG Manager DeTroye, the DESGC Director decided, in proposing for FY09 funds, to request zero funds for general public and external relations programs.

PROGRAM CONTRIBUTIONS TO PART MEASURES

- **Longitudinal Tracking:** Total awards in FY09 = 38; Fellowship/Scholarship = 28; Higher Education/Research Infrastructure = 18. Of the total awards, 3 represent underrepresented minority F/S funding, and 1 is a student with disability (hearing-impaired). Since FY2006, 2 previously DESGC-funded Fellows have accepted STEM positions: one in K-12 STEM academia and one in “other” STEM academia. Also, 2 previously DESGC-funded Higher Education students have accepted STEM positions: both in “other” STEM academia.
- **Course Development:** None
- **Matching Funds:** In FY09, the matching funds obtained by DESGC included tuition scholarships provided by UD for each competitive graduate fellowship, a donation from Bartol Research Foundation, in-kind match from faculty members associated with DESGC, use-of-equipment match from DSU, and funds from DASEF. The matching funds in FY09 totaled \$441,334. This results in an augmentation of the NASA award (\$590K) by 75%.
- **Minority-Serving Institutions:** Delaware’s MSI, Delaware State University, is an active affiliate of DESGC. Two of the DESGC graduate fellows in FY09 are DSU students. One of the DESGC Research Infrastructure grants was awarded to Dr Melikechi, Applied Optics Center, at DSU. Dr Melikechi has participated in reviewing proposals for undergrad and grad applications for DESGC funding.

Although not formally an MSI, Delaware’s 2-year College (Delaware Technical and Community College: DTCC) has 25% enrollment of Black non-Hispanic students. DESGC has active contacts with one faculty member on each of the four campuses of

DTCC, and these contacts have resulted in applications being submitted for undergrad tuition scholarships.

IMPROVEMENTS MADE IN THE PAST YEAR

Three major changes in resource allocation were made by DESGC in FY09. (i) Increased funding of the Program Coordinator, so that she could spend full-time on DESGC (and NASA/EPSCoR) business: this has improved our ability to make timely responses to NASA/HQ requests. (ii) Increased funding of graduate fellows: this has led to an upsurge in DESGC-funded research work in DE, including an unprecedented number of students in DE as a whole, and especially at Delaware's MSI. (iii) Increased funding of undergraduate tuition scholarships at all affiliates of the DESGC consortium. (iv) Enhanced allocation of funds for Dr Stephanie Wright's programs for professional development of teachers in Delaware schools.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

(1) 4-year academic institutions:

(a) The lead institution of DESGC is the University of Delaware [UD]. UD is classified by the Carnegie Foundation for the Advancement of Teaching as a research university with very high research activity, a designation accorded to fewer than three percent of the more than 4,200 degree-granting institutions in the USA. Currently, UD has 17,000 undergrads and 3,400 grad students enrolled, and offers bachelor degrees in all STEM-G subject areas. Most of the DESGC graduate fellows are UD students from a variety of colleges: Arts and Sciences (Departments of Physics/Astronomy and Geography), Engineering (Departments of Mechanical and Chemical Engineering, and Material Sciences), Marine and Earth Studies. UD undergrads from a variety of colleges have benefitted from DESGC-funded tuition-scholarships and summer research opportunities. Researchers in various colleges (Engineering, Marine Studies, Arts/Sciences) have benefitted since 2005 from DESGC Research Infrastructure Funds.

(b) Delaware State University [DSU], an MSI, has 3400 undergrads, 400 grad students, and offers bachelor degrees in at least one STEM-G area. The student body is 77% Black non-Hispanic. Two of the currently funded DESGC grad fellows are DSU students. DSU undergrads have benefitted from DESGC-funded tuition scholarships and summer research opportunities, both on- and off-campus. Researchers in the Applied Optics Center have benefitted since 2005 from DESGC Research Infrastructure Funds.

(c) Wilmington University [4600 undergrads, 3800 grads] offers a range of bachelor degrees which includes one or more of the STEM-G disciplines. WU undergrads have benefitted from DESGC-funded tuition scholarships, from DESGC-funded trips to

national science teachers conferences, and from DESGC-sponsored scholarships for a pilot training program.

(d) Wesley College [2500 undergrads] offers a range of bachelor degrees in the STEM-G disciplines. 39 percent of the student body are African-American, and 57 percent are female. Before Wesley became an affiliate of DESGC, Wesley undergraduates were already actively involved in research programs in biology and chemistry, with funding support from an NSF/EPSCoR program. Now, DESGC provides undergrad tuition support as well as extra funds for summer research activities on campus.

(e) Villanova University and Swarthmore College, affiliates in nearby PA, provide DESGC-sponsored summer research opportunities for students in physics/astronomy.

(2) 2-year Academic Institution

Delaware Technical and Community College (DTCC), with a total of 15,000 students on 4 campuses distributed widely across the State. The student body includes 25% Black non-Hispanic. DTCC students on 3 of the 4 campuses have benefitted from DESGC-funded tuition scholarships. One of the DTCC minority students continues to receive DESGC tuition help when he transferred to UD for the upper-class years of his Bachelor's degree in Engineering.

(3) Delaware AeroSpace Education Foundation (DASEF). DASEF is an enterprise founded in 1989 by Dr Stephanie Wright (at one time, Delaware's Teacher in Space) to create an exceptional learning environment that inspires children and their families with an appreciation of the Earth and its place in the universe. DASEF has contributed to the academic development of over 300,000 students, educators, and the general public through the delivery of context-based activities consistent with current aerospace research and development.

(4) Industrial affiliates: ILC Dover (makers of space suits for NASA) and E.I. DuPont and Nemours Chemicals supply active members to DESGC's Advisory Board. Also, senior design projects in the UD Mechanical Engineering department have benefitted from sponsorship by ILC Dover.

(5) NASA Explorer School in Smyrna DE has benefitted from DESGC funding by a program run by teacher Linda Katts who is introducing equipment to help students in interactive participation in middle-school math classrooms.

Sum total of plusses and minuses: How well did DESGC do in achieving the metrics which were proposed in the FY09 proposal? Here are our results, as listed above.

Number of +: 31
Number of -: 7

Percentage of +: 82%

Respectfully submitted,

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