

West Virginia Space Grant Consortium
West Virginia University
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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 West Virginia Space Grant Consortium is a Designated Consortium funded at a level of \$785,000 for fiscal year 2009.

PROGRAM GOALS

Our overarching goal is to extend the benefits of NASA's research and education to all citizens of West Virginia. Our Board envisions our presence in every county of the state to have a positive impact on the lives of the citizens of West Virginia. To achieve these objectives, we will further expand our reach: we will work closer with other governmental and private entities concerned with building research infrastructure and promoting workforce development programs; and we will continue to be effective in providing a pipeline for high-tech workers of the future for NASA and the rest of the nation. Specifically, the goals that were outlined in our five-year plan are:

- To contribute to, and advance NASA's vision and strategies as outlined in various NASA documents (such as the Vision for Space Exploration and the Aldridge Report), specifically in terms of workforce development
- To contribute to the state of West Virginia's efforts in research infrastructure development, particularly in the high-technology sector, and improving levels of science and math in K-12 education
- To increase the participation of under-represented groups in our programs for students and faculty.

Target for Participation of Under-represented Groups and Women: As reported by the National Center for Education Statistics Digest, the minority enrollment in degree-granting institutions, by race/ethnicity in West Virginia (excluding the Asian/Pacific Islander category) is 6.7%, one of the lowest in the nation. Recognizing the need to

include this population in all aspects of Consortium activities, the WVSGC set a goal of 8.37%, which is 25% above the state average. In FY 2009 we exceeded our goal by about 32% (the actual percentage achieved was 11.1%).

Diversity and Involvement with Minority Serving Institutions: Both of the two HBCUs in our state are members of the WVSGC. These two institutions, Bluefield State College and West Virginia State University, are treated similar to all other academic affiliates in terms of having access to our regular internships (\$11,000 per year, 1:1 cost share), research (\$6,000 per year, 1:1 cost share) and various outreach opportunities. The total amount of subcontract for each institution was \$34,000.

Newly Adopted SMART Objectives for Higher Education Programs

Subsequent to the reviews of our 20th year evaluation, the following SMART objectives were specifically developed for our Higher Education Programs and approved by the Board of Directors of WVSGC.

“The objective of WVSGC’s Higher Education Program is to enhance higher education capabilities in STEM in West Virginia. WVSGC is in a unique position to initiate and support innovative programs that enable WV students to engage in hands-on experiences that will better prepare them for careers at NASA, its contractors, and other high-technology companies in the US. Our SMART objectives are:

- To support at least two new STEM courses per year at undergraduate and graduate levels at WVSGC academic affiliates;
- To initiate and support programs such as the Balloon Satellite Project, Microgravity Research Program, and High Altitude Student Platform (HASP); and to participate in programs such as RockOn that have been made available through other Consortia;
- To insure sustainability by securing at least 1:1 cost share from participating affiliates for the above higher education programs; and
- To provide partial support to special projects of student organizations such as AIAA, SWE, NSBE, Astronomy Club, and Student Partnership for the Advancement of Cosmic Exploration (S.P.A.C.E.)”

As part of our improvement plan, we contracted the NSGF to work with WVSGC to implement our student longitudinal tracking system. This is our first year using the services of the NSGF. The following information was compiled from the NSGF Longitudinal Tracking program.

Percentage of students whom have taken their next step and have been successfully tracked though their next step vs. last year of SG support:

- 67% for 2006

- 96% for 2007
- 100% for 2008
- n/a for 2009 – all participants still enrolled
- 86% for 2006-2009

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

Outcome 1: Employ and Educate

In 2009 WVSGC provided numerous opportunities for students at its academic affiliates to participate in summer internships at NASA centers as well as high tech companies in West Virginia. We also sponsored several higher education programs that benefited our STEM students directly and helped them to get them ready for a future in STEM career. Overall, 14 students (5 female, 10 male) interned at a NASA center or High Tech company in the summer of 2009. They represented eleven academic departments and four institutions of higher education in West Virginia. Four students were placed at NASA Academies. Our students also participated in internships at JPL, MSFC Propulsion, LARSS, and the LPSA program at GSFC.

Members of a student organization founded and supported by WVSGC “Student Partnership for the Advancement of Cosmic Exploration” (SPACE) worked on a the Autonomous Flight Safety System (AFSS) program in collaboration with NASA Wallops Facility and KSC to develop an autonomous on-board range safety system that can augment or replace the functions of the traditional human-in-the-loop system. Redundant AFSS processors evaluate data from onboard Global Positioning System (GPS) and inertial navigation unit (INU) navigation sensors: configurable rule-based algorithms are used to make flight termination decisions. Mission rules are developed by the local Range Safety Authorities using the inventory of rule types taken from current human-in-the-loop operational flight safety practices. WVSGC obtained grant funding (\$135,000) for the cost of this project which involved 8 engineering students at West Virginia University (3 graduate students, 5 undergraduate students; 2 females, 6 males).

The following information was compiled from the NSGF Longitudinal Tracking program:

- 73 students significantly supported from FY09 funds
 - 59 in Fellowship & Scholarships
 - 14 in Higher Education/Research programs
- 26 students took next step in FY09 (SG participation supported from FY06-FY09 funds)
 - 15 graduated and are pursuing advanced STEM degrees
 - 2 accepted positions at NASA contractors
 - 7 accepted STEM positions in industry
 - 1 accepted at position at NASA
 - 1 went into a non-STEM field

The following comments of note were recently submitted to the NASA WVSGC office as part of its longitudinal tracking program.

Thank you so much for sponsoring my NASA Academy Summer! I am having an absolute blast! I am learning a great amount about NASA as my childhood dream of working here is becoming less of a dream and more of a reality. Greatest Thanks! (Kylee Underwood, WVU Physics student, NASA 2009 Scholarship, NASA Glenn Intern).

The Space Grant program highly impacted my life by allowing me to research during the school year. I learned more than a class could ever teach; and found the 'ah ha' moment that exemplifies scientific research. My education was mainly increased by the mass journals read, and the help from fellow researchers. My life was impacted by more time spent learning rather than 'working'; in the sense that my job was learning. Perhaps the greatest impact was meeting many professors in several disciplines to find that science evolves everyone and everything (Brooke Adams, 2009 West Virginia Space Grant Scholar).

I feel that the best impact my participation had was having an association with NASA. NASA is an excellent organization, and it was a good experience simply being involved with it. I work for the Environmental, Safety and Health department of Lockheed Martin; I also support BAE Systems who leases a building from us. My particular job does not directly deal with aerospace, but I support the industry indirectly through my position (Sarah Prince, 2005 West Virginia Space Grant Scholar, 2006 West Virginia Space Grant Scholar, 2007 West Virginia Space Grant Scholar, Lockheed Martin - Environmental Engineer).

Working on my WV NASA grant gave me new skills in scientific imaging, anatomical understanding, dissection techniques, etc. I have recently been a co-author on a paper in press regarding the research done during the grant period and am the lead author on two other papers currently in review. I gained a lot of experience in writing while working for Dr. Holliday and I was very grateful for the time he put into training and helping me along (Nicholas Gardner, 2008 West Virginia Space Grant Scholar, 2009 West Virginia Space Grant Scholar).

Outcome 2: Educate and Engage

WVSGC continued its support of Micro-Gravity Research Program, High Altitude Student Launch (HASP) and initiated RockOn and RockSat Programs at West Virginia University. 23 students and 5 faculty participated in these three programs (26 male, 2 female, 26 Caucasian, 2 African American).

At West Virginia Wesleyan College, Professor Delaney reported that her students, Norm Biggs (a rising senior) and Ryan Mischler (a rising sophomore) spent last summer working on the optimal energy grant, under the guidance of Professor Wiest. The two

students explored many sources of non-fossil fuel energy that would fit in well with a remote location on Earth or on a moon or another planet. They explored the energy sources of solar cells, geothermal gradients, a wind turbine that would be powered either by atmospheric wind currents or possibly solar wind, gravitational shift in the crustal material due to the movement of a moon or a nearby planet, movement of a large pendulum on a planet or moon due to its spin, the Peltier effect due to temperature differences, the piezoelectric effect due to forces present, the fuel cell and hydrogen separated from water, nuclear fusion due to the presence of H-2 and He-3.

The following comments of note were recently submitted to the NSGF as part of its longitudinal tracking program.

Question: How did participation in these programs impact your education and life?

The Space Grant program gave me a better understanding of working within a group. This team project successfully jumped many hurdles to accomplish goals that were given to us. I participated in going the extra mile, doing what it took to get things done and I am proud that we accomplished so much. In the future I will be able to identify the right approach more effectively. I have seen first-hand the power of brainstorming and working in a participative environment (Scott Carr, 2007 West Virginia Space Grant Scholar, Fairmont-Marion County Transit Authority - Operations Manager).

By having more research experience, it has given me a considerable advantage when applying for jobs and graduate programs (Elizabeth Fet, 2005 West Virginia Space Grant Scholar - Marshall University).

Since graduation, I have been a computer engineer at the NASA IV&V Facility in Fairmont, WV (Justin Morris, 2005 Summer Student Internship -West Virginia University, 2005 Summer Student Internship -West Virginia University, 2006 West Virginia Space Grant Scholar -West Virginia University, 2006 NASA IV&V Summer Internship -West Virginia University).

Thanks to the NASA West Virginia Space Grant, I have been able to spend the majority of my free time performing research instead of working at a part-time job. The past year has helped me to realize how much I truly love and enjoy biochemical research. Though I considered other graduate degrees in the past, I now believe that a dual M.D./Ph.D. program will give me the greatest possibilities for my future (Tiffany Bell, 2008 West Virginia Space Grant Scholar).

The Space Grant program has allowed me to expand my education to include subjects otherwise not available at my college. I'm very grateful for it, and it has given me confidence in myself as a student and future scientist (Spencer Connor, 2007 West Virginia Space Grant Scholar, 2008 West Virginia Space Grant Scholar, Cabela's - Sales).

Outcome 3: Engage and Inspire

An inspiring activity sponsored by WVSGC is the FIRST LEGO League Robotics Championship at Wheeling Jesuit University. Dr Meri Cummings, the faculty advisor for this project reports: In order to promote participation in this long-term STEM event—culminating in a December state robotics tournament—Cummings provided workshops to the Girl Scouts of Black Diamond Council and at the West Virginia Science Teachers Association’s annual conference. Additionally, through past Space Grant funding, the Educator Resource Center out of the NASA IV&V Office at Fairmont State University provided workshops and robotics kit and laptop checkouts for participants. This year 30 teams planned to compete on Dec. 19, 2009, making it the biggest FLL state tournament. Due to snow, ten teams were unable to attend the event. A makeup Robotics Scrimmage was scheduled for no charge on Saturday May 8, 2010 for those teams who missed the Dec. tournament. The scrimmage was held at West Virginia University—organized by experienced team coaches, Dr. Earl Scime and Phil Tucker, and some of their current and past FLL team members.

In addition to Wheeling Jesuit University, West Virginia University, VISTA employees, and other community volunteers, middle school, high school and university students served at the tournament as the scorekeeper, table referees, photographers, and table setters.

As part of the evaluation methodology, each year participating coaches are asked to make suggestions for improving the experience for their students. West Virginia FLL teams participate in research through the national FIRST program headquartered in Manchester, NH conducted by Brandeis University (see the FIRST LEGO League website: <http://www.usfirst.org/roboticsprograms/fll/default.aspx?id=970>).

The target audience was youth ages 9 through 14 across West Virginia, including minorities, girls, persons with disabilities, and youth from families with low incomes. West Virginia has a low percentage of ethnic minority students, but a large percentage of low income families. While demographic information was requested in an optional section of the registration form given to team coaches, very few provided the details.

Several students throughout the state participated in robotics events but opted not to come to the tournament. Many siblings and parents accompanied team members to the tournament, so the event had a wider impact than just the team members.

“Afterschool Universe in WV” was another program supported by WVSGC which was led by Dr. Deb Hemler of Fairmont State University and Ms. Pamela Casto of the NASA IV&V Facility ERC. They reported the following:

- 20 kits were constructed and are currently in use by qualified Afterschool Universe (AU) instructors
- Three workshops were conducted on the Afterschool Universe curriculum reaching 38 educators directly involved in after school programs.

- 25 teachers were trained during three additional workshops conducted as follow ups to provide telescope instruction. The telescopes are meant to complement the Afterschool Universe curriculum

Evaluation of the AU workshop found that 95% of participants were either satisfied or extremely satisfied with the presentation of the workshop, that the experience was valuable, and that the workshop was well organized. There were no overall negative responses; the other 5% were neutral. 100% of the applicants either agreed or strongly agreed that they would be able to apply the content from the workshop and that the objectives of the workshop were clear. Some comments which reflect the quality of the program and the confidence with which participants felt about implementing with their students include:

“I really liked the fact that we did some activities at our desks and then we went outside for others. The hands-on quality of this curriculum is wonderful!!!”

“Very nicely done...well presented and organized. I feel I can take this away and work on it immediately with my students.”

“Very applicable to the program for which I will use it”

PROGRAM ACCOMPLISHMENTS

Outcome 1: Employ and Educate

Fellowships/Scholarships: We made 157 F/S awards including 11 Undergraduate Research Fellowships (up to \$5,000 each) and 11 Graduate Fellowships (\$24,000 each). Ten students were funded as part of research grant awards made to faculty and six (6) students received a fellowship to participate in the Reduced Gravity Research Program.

Out of 135 fellowship/scholarship awards at the affiliate level, 56 (41.8%) went to female students, and 15 (11.1%) went to students from underrepresented groups. Statistics from the US Department of Education, National Center for Education, indicate that the average enrollment by ethnicity in the state of West Virginia for African Americans is 6%; and for Hispanic it is 1%. We have exceeded these averages by a considerable amount.

12 Undergraduate Research Fellowships (up to \$5,000) were awarded at the Consortium level, as follows:

Bethany College	2 awards
Fairmont State University	1 award
Marshall University	2 awards
WV Wesleyan College	1 award
West Virginia University	6 awards

The number and breakdown of Graduate Research Fellowships (up to \$12,000 plus cost share of 1:1) was as follows:

Marshall University	2 awards
West Virginia University	9 awards

Breakdown of the number of students who have received direct support funding during the FY2009 reporting period by affiliate was as follows:

West Virginia University	58
Bethany College	13
Bluefield State College	10
Fairmont State University	4
Marshall University	31
Shepherd University	23
West Liberty State University	9
Wheeling Jesuit University	12
WV State University	9
WV Wesleyan College	13
WVU Institute of Technology	5
Total	187

Other “Higher Education” programs supported by WVSGC included:

Summer Internships at NASA Centers and WV High Tech Companies: We are proud that four of our students were accepted for internships at NASA Academies. Our students also participated in internships at JPL, MSFC Propulsion, LARSS, and the LPSA program at GSFC. We supported a total of 12 students in this category.

Balloon Satellite Course (Spring 2009 semester); Microgravity Program at West Virginia University; Support for AIAA; Sponsorship of the Annual Research Symposium at WV State University (an HBCU); Support for Astronomy Club at WV; support for Career Fairs (CEMR, NASA LARSS, High Tech Companies & NASA IV&V) which were attended by over 100 employer and over 1,500 students; and support for NASA Scholars to attend conferences to present their research papers.

Research Infrastructure Programs: In addition to the Joint University-Industry Research Opportunity Program, explained below, WVSGC supports two programs in this category:

- Research Initiation Grants are competed for at the Consortium level. These grants are awarded in the amount of (up to) \$20,000 of NASA funds augmented by \$10,000 in cost share. Five such awards were made last year to researchers from three affiliates. NASA: \$99,057; Cost Share: \$51,797; Total: \$150,854. In addition to the required collaboration with a NASA scientist, these researchers reported to have collaborated with colleagues from University of Chicago, Harvard University, and University of Texas. They have also reported the

- submission of several proposals to funding agencies and publication of their research in peer-reviewed journals.
- Research Enhancement Awards are competed for at the affiliate level. The lead institution does not participate in this program. Per an annual subcontract, each affiliate receives \$6,000 in NASA funds. Issuing the RFP, deciding on review criteria, and making the award decisions are accomplished by the NASA Committee at each affiliate independently

Breakdown of the number of Research Initiation Grant awards during the FY2009 reporting period is as follows:

Dr. Yu Gu (West Virginia University): A Test Bed for Propulsion Assisted Flight Control.

Dr. K. Subramani (West Virginia University): Decision Procedures for Lattice Points and Fractional Solutions in the Octagon Domain.

Dr. Jagan Valluri (Marshall University): Biofuels Production from Microalgae.

Dr. Menashi Cohenford (Marshall University): FT-IR Microspectroscopic Evaluation of Colorectal Tissue Sections: A Study Employing Chemometric Analysis.

Dr. Hongwei Yu (Marshall University): Developing a Genetic System to Evaluate the Radiation Effect on DNA Damage and Repair.

Total value of these grants was \$151,500 (\$100,000 NASA, \$51,500 cost share)

Breakdown of the number of Research Enhancement Awards (REA) during the FY2009 reporting period was as follow:

- | | |
|-----------------------------|---|
| Bethany College: | 1 award (PI: Dr. Katrina Cooper) |
| Fairmont State University: | 2 awards (PIs: Dr. Don Trisel and Dr. Elizabeth Savage) |
| Marshall University: | 2 awards (PIs: Drs. Jeffrey Kovatch and Aley El-Shazly; Dr. Derrick R. Kolling) |
| Shepherd University: | 5 awards (PIs: Dr. Carol Plautz; Dr. Nicholas Martin; Dr. Mengyang Li; Dr. Seung-yun Kim; Dr. Jason Best) |
| West Liberty University: | 5 awards (PIs: Dr. Jarrett Aguilar; Dr. Norman Clampitt; Dr. Matthew Zdilla; Dr. Ken Cushman; Dr. Roger Seeber) |
| Wheeling Jesuit University: | 3 awards (PIs: Dr. James Collfield; Dr. Michael Hoops; Dr. Julie Osland) |

WV State University: 6 awards (PIs: Dr. Gerald Hankins; Dr. Tim Ruhnke; Dr. Ernest Sekabunga; Dr. Jeptha Knob and Dr. Versailles (from Kentucky) and Dr. Andrew Schedl; Dr. David Huber; Dr. Barbara Liedl)

WV Wesleyan College 3 awards (PIs: Dr. Trevor Stevens; Dr. Melanie Sal; Tracey Delaney)

The total value of these projects was \$121,000 (including 1:1 cost share).

Research Partnerships

In an attempt to foster collaborative research between faculty at Space Grant affiliates and the high tech industry in the state, WVSGC designed and implements the "Joint University-Industry Research Opportunity Program."

Two projects were funded under this program in 2009. The first collaboration took place between Drs. Popson and Delaney of WV Wesleyan College and Extreme Endeavors and Consulting. The second collaboration was between Dr. Hongwei Yu of Marshall University and Progenesis Technologies.

The total value of these projects was \$80,000 (\$40,000 NASA, \$40,000 cost share).

Outcome 2: Educate and Engage

In the "*Higher Education*" category, WVSGC has supported and implemented several programs, as follows:

College Course Development

College Course Development projects that were funded during the FY2009 reporting period were as follows:

Shepherd University: Applied Mathematics and Engineering Capstone Course

West Virginia University: Engineering Calculus Project

West Virginia Wesleyan College: Introductory Astrophysics Course

Marshall University: Back on Track in Calculus

The total value of these projects was \$81,218 (\$39,298 NASA, \$41,920 cost share).

K-12 Professional and Curriculum Development Program

Projects supported in this category during the FY2009 reporting period is as follows:

Ms. Eileen Poling of Tucker Valley Elementary Middle School, PI for “Reach for the Stars” project reports:

“October 2009 found two teachers travelled to Victorville, California for training on the Goldstone Apple Valley Radio Telescope (GAVRT). One part of the training was learning about and doing hands-on activities for lessons to teacher students about radio waves, the electromagnetic spectrum, and astronomy. A second part of the training was manipulating GAVRT and downloading data. A third component was a field trip to explore the many telescopes located on the high desert of California. Upon returning to West Virginia, the two teachers began planning the establishment of the first “Radio Astronomy Club” at Tucker Valley Elementary and Middle School. Materials were ordered and registration forms were distributed to all students in grades 4-8. A total of twenty students applied to be members and all became the charter members of the club.”

Dr. Earl Scime of West Virginia University: “Mountaineer Area Robotics (MARS)” the faculty advisor for this project, reports:

“Through the support of a WV Space Grant Pre-College Outreach and Curriculum Development Program grant, the Mountaineer Area Robotics (MARS) program was able to launch a very successful, community-wide, middle-school FIRST Lego League (FLL) robotics program in Monongalia County. In addition to the middle school program, the WV Space Grant program also supported the development of a community-wide, high school FIRST Robotics Competition robotics program in Monongalia County. From May 2009 through April 2010, the MARS program accomplished a number of key milestones: a central practice facility for the county-wide FIRST Lego League (FLL) program was again obtained from the Monongalia County Board of Education; fourteen local FLL teams were mentored by the MARS program and ten FLL teams participated in the WV State FLL tournament on December 18, 2009 (four teams were unable to travel to Wheeling because of heavy snowfall); the MARS program hosted a “pre-championship” scrimmage in Morgantown which was attended by over 200 youth; MARS hosted a spring scrimmage for WV FLL teams unable to attend the state tournament; and the FIRST Robotics Competition team competed in the Pittsburgh Regional, the North Carolina Regional, and the World Championship.”

Dr. Elizabeth Strong of West Liberty University, PI of “Using Science Notebooks in Elementary Science Inquiry” project reports:

“This project included up to 44 teachers of K-6 students from Brooke, Hancock, Marshall, Ohio, and Wetzel counties. These teachers serve an average class size of approximately twenty students annually. One Day workshop focused on recording data as scientists do and on writing across the curriculum.”

WV Math Field Day: Math Field Day was developed to interest and inspire students to achieve through competition. This event had over 230 participants

The total value of these projects was \$31,784 (\$14,971 NASA, \$16,813 cost share).

Outcome 3: Engage and Inspire

Formal and Informal Education Programs

NASA WV Space Grant Consortium designed and implemented a competitive program entitled “West Virginia Space Grant Consortium Public Extension and Outreach Grant” Program. A brief description of projects funded in 2009 is provided below.

- WV State Fair, held August 13-21, 2009, in collaboration with NASA Langley and NASA IV&V Facility. Over 4,000 people visited our booth.
- Eight Annual Undergraduate Research Day at the Capitol took place at the Capitol Rotunda. This event helped members of the State Legislature and Executive Branch understand the importance of undergraduate research by talking directly with the students. The event drew over 400 visitors.
- Eight Grade Career Day at Mylan Park. Over 800 8th grade students from Monongalia County participated in the event.

Projects that were competitively supported in this category during the FY2009 reporting period were as follows:

Dr. Deb Hemler of Fairmont State University: “Afterschool Universe in West Virginia”

Mr. Eriks Janelsins of Oglebay Institute: “Astronomy in the Park: Observing at Oglebay”

Mr. Kyle Phillips of West Virginia University: “The SPACE Perspective: Outreach Your Expectations, Reach for Your Dreams”

Dr. Robert Strong of West Liberty University: “Nano Scale Planet Walk”

The total value of these projects was \$100,674 (\$47,515 NASA, \$53,159 cost share).

PROGRAM CONTRIBUTIONS TO PART MEASURES

Longitudinal Tracking

Student Data and Longitudinal Tracking: Total awards = 187; Fellowship/Scholarship = 157; Higher Education/Research Infrastructure = 30; 9.63% of the total award represent underrepresented minority funding. During the FY09 program year 15 graduated and are pursuing advanced STEM degrees, 2 accepted positions at NASA contractors, 7 accepted

STEM positions in industry, 1 accepted at position at NASA, and 1 went into a non-STEM field.

Compared to FY2008 data, a significant drop was noticed because after a rigorous review we realized that we have counted students in multiple programs in multiple years. (For example, in 2006 we counted Kerri Phillips as a NASA Scholar and an NASA Intern). As a result of our 20th year review and improvement plan, we are being more meticulous in reviewing and tracking our students. An additional comment regarding the Higher Education drop is due to the removal of the Balloon Satellite Student Program from our student tracking component due to the fact they no longer meet our criteria for inclusion in the longitudinal tracking system.

Course Development

In the FY2009 reporting period, the WVSGC has sponsored the development and offering of the following college level courses:

- Astrophysics Course Development Bert Popson/ Tracey Delaney at WV Wesleyan College: The astrophysics course has been added to the curriculum with the first run set for Fall 2010 under Phys 388, Astrophysics. The textbook for the course will be *An Introduction to Modern Astrophysics* by B. W. Carroll and D. A. Ostlie (2nd edition, 2006, Pearson Addison Wesley).
- Back on Track in Calculus by Evelyn Pupplo-Cody; MTH 120 at Marshall University. 15 undergraduate students. This course was designed to help students who were struggling with calculus one semester to get ready to return to calculus during the next semester. The course was offered during fall 2009 and spring 2010. It ran for the last eight weeks of each semester Marshall.
- Applied Mathematics/ Engineering Capstone course by Christopher Elmer at Shepherd University, Spring 2010. 29 students involved, 16 male not underrepresented, 1 male underrepresented, 11 female not underrepresented and 1 female underrepresented. The PI's overall desire with this course is to provide all STEM majors at Shepherd University with the skills to necessary to become a research scientist or graduate student in the STEM fields. The underlying theme of research addressed during this project was the development of two wheeled vehicles (bicycles and motorcycles, single track, which we will refer to as bikes). It teaches mathematical model development, physical and experimental design techniques, and nonlinear dynamical systems. The goal of this project is for the applied mathematics/engineering majors at Shepherd University to gain experience at being research scientists in their respective specializations, pulling together the skills obtained in their coursework while at Shepherd and learning to work across disciplines.
- RockSat Project course by Demitris Vassiliadis at West Virginia University, 11 students: 10 Male, 1 female, 2 African Americans, 10 Undergraduate and 1

graduate student. Payload design and testing (functional, electrical, thermal, vibrational, etc). Activity partner: ATK industries. RockSat 2010 site is <http://ulysses.phys.wvu.edu/~rocket/index.htm>

Matching Funds

In 2009, we secured and documented a total of \$842,607 in cost share. This cost share included \$221,658 from federal and \$620,949 from non-federal sources. Please note that the value of time spent by each of our Board members and NASA Committees at each affiliate has not been included in the cost share figures reported. Also, the fact that F & A (overhead) charges have been waived by the lead institution has enabled us to devote more of our resources to funding various programs.

Minority-Serving Institutions

The only two HBCUs in West Virginia are members of the WVSGC. Bluefield State College is represented by Dr. Felica Wooten Williams and WV State University is represented by Dr. Naveed Zaman. In 2009, both institutions were active in the Consortium and participated in a number of programs sponsored by WVSGC. As indicated before, nine (9) NASA fellowships were awarded at Bluefield State College and 10 were awarded at WV State University. WVSGC was a sponsor of the Annual Research Symposium at WV State University. WVSGC also continued its funding of the Emerging Leaders Institute at Bluefield State College. Six (6) Research Enhancement mini-grants were awarded to faculty at WV State University.

IMPROVEMENTS MADE IN THE PAST YEAR

WVSGC benefits from an engaged and active Board of Directors that examines every aspect of the Consortium's operations critically at every Board meeting. Changes made to WVSGC's operations are mostly evolutionary and represent minor modifications in the course of our operations. However, the following items can be mentioned as more important enhancements to program:

- Addition of a new academic affiliate: The Director and Program Manager of WVSGC met with Dr. Peter Barr, President of Glenville State College, and made him aware of the Consortium's activities and invited Glenville State to join the Space Grant network. President Barr attended our Spring 2010 meeting of the Board of Directors in Charleston, WV and made a formal presentation and request to join WVSGC. This request was unanimously approved by the Board. Dr. Barr will be representing Glenville State College on the WVSGC Board of Directors.
- We continued with and refined our on-line submission and review of all proposals submitted to WVSGC for funding. This system was designed and supported by the Space Grant Foundation.
- We increased our emphasis on recruitment of under-represented minorities. As reported before, out of 141 fellowship/scholarship awards at the affiliate level, 16 (11.3%) went to students from underrepresented groups. Statistics from the US

- Department of Education, National Center for Education, indicate that the average enrollment by ethnicity in the state of West Virginia for African Americans is 6%; and for Hispanic it is 1%. We are aggressively pursuing this goal and we use every opportunity in face-to-face meetings at conferences, student presentation and other events to attract under-represented students to our programs.
- We hired a new staff member, Ms. Amy Diznoff, to help with our outreach activities, preparing grant proposals, student contact and general office duties.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

The Consortium is governed by a Board of Directors consisting of one member from each affiliate organization and a few representatives from non-profit organizations and state government agencies. In accordance with its Mission Statement and its by-laws, the Board sets all policies and procedures governing the Consortium operations. Characteristics of our academic and other affiliates of the Consortium are as follow:

- West Virginia University, largest public university in the state, Land Grant, primarily research oriented, represented by Dr. Curt Peterson.
- Marshall University, second largest public university in the state, research oriented, represented by Dr. Charles Somerville.
- Bluefield State College, an HBCU, primarily teaching oriented public university, represented by Dr. Felica Wooten Williams.
- WV State University, an HBCU, Land Grant, primarily teaching oriented public university, represented by Dr. Naveed Zaman.
- Shepherd University, primarily teaching oriented public university, represented by Dr. Reza Mirdamadi.
- WV Wesleyan College, teaching and research oriented private college, represented by Dr. Joseph Wiest.
- Wheeling Jesuit University, teaching and research oriented private university, represented by Ms. Margie Cook.
- Bethany College, teaching and research oriented private college, represented by Dr. Robert Paysen.
- Fairmont State University, teaching and research oriented public university, represented by Dr. Anthony Gilberti.
- West Liberty University, primarily teaching oriented public college, represented by Dr. Robert Kreisberg.
- WVU Institute of Technology, research and teaching oriented public university, represented by Dr. Garth Thomas.
- Glenville State College, teaching and research oriented public college, represented by Dr. Peter Barr.
- The Clay Center for Arts and Sciences, non-profit organization with the mission to inspire creativity, learning and wonder through experiences in the arts & sciences, represented by Mr. Lewis Ferguson.

- WV High Technology Consortium Foundation, non-profit organization to promote high technology and economic growth in the state, represented by Mr. James Estep.
- Polyhedron Learning Media, Inc. A technology development company specializing in creating educational software, audio/video, and print materials, represented by Dr. Jeanne Finstein.
- NASA IV & Facility, part of an Agency-wide strategy to provide the highest achievable levels of safety and cost-effectiveness for mission critical software for all, represented by Ms. Lisa Montgomery.
- NRAO Green Bank Facility, home to the Robert C. Byrd Green Bank Telescope, the largest fully steerable dish in the world, represented by Dr. Karen O'Neil.
- Dr. Anne Cavalier: Economic and workforce development liaison, US Dept of Commerce, Economic Development Administration
- Mr. Denny Avers, Engineering Consultant, a founding member of the Consortium, then representing IBM