

Undergraduate Student Research Project (USRP)  
Administered by Universities Space Research Association  
Cooperative Agreement

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9/30/10

## PROJECT DESCRIPTION

The NASA Undergraduate Student Research Project (*USRP*) offers undergraduate students across the United States immersive research and engineering internship experiences at all ten NASA Field Centers and two NASA Research Facilities. *USRP* is NASA's largest nationwide internship program for undergraduates. The purpose of *USRP* is three-fold:

- To extend and strengthen NASA's commitment to educational excellence and university research, highlighting the critical need to increase the Nation's undergraduate and graduate science, engineering, mathematics, and technology (STEM) skill base;
- To build a national NASA STEM education pipeline - from existing NASA K-12 STEM education program activities to NASA Higher Education Program options — that encourage and facilitate student interest in future professional opportunities with NASA and its partner organizations. Such opportunities might include NASA career employment, temporary assignment, undergraduate and graduate co-op appointment, Space Grant scholarships and fellowships, or contractor positions; and
- To attract STEM undergraduate students from the widest array of backgrounds, who are fully representative of America's racial, ethnic, and cultural diversity and to provide them with hands-on, challenging research experiences that stimulate continued student interest in the fields/disciplines aligned with NASA's research and development mission.

*USRP* applicants must be classified as rising sophomores, juniors or seniors at the beginning of the internship session for which they are applying. Highly qualified applicants must be pursuing an undergraduate STEM degree that aligns with NASA's critical core competency needs. Eligible fields of study are academic majors or demonstrated coursework concentration in engineering, mathematics, computer science or physical/life sciences.

*USRP* will consist of a 10–15 week research experience at a NASA Center under the supervision of a NASA technical mentor. Selected students must be available to work 10 consecutive weeks at 40 hours per week during the summer or 15 consecutive weeks at 40 hours per week during spring or fall. The exact session start and end dates of the sessions are determined by NASA Centers.

*USRP* Students receive a \$6,000 (10-week summer session) or \$9,000 (15-week spring or fall session) stipend for the research experience plus one round-trip airfare or ground transportation allowance to and from the NASA Center. A location allowance may be provided for *USRP* students at specific high cost NASA Centers.

*USRP* internships are open to U.S. Citizens with a cumulative GPA of 3.0, currently enrolled full-time in an undergraduate STEM degree program and classified as a sophomore or above by the start of the internship. Interns work side-by-side with NASA engineers and scientists performing activities ranging from basic research and development to mission operations. At the completion of the research session, students must submit a 10-page technical paper on their *NASA-USRP* research experience and complete an exit survey. Students may also be asked to discuss their research in public forums and/or participate in NASA-sponsored colloquia, workshops and technology demonstrations.

## USRP 2010 PROJECT GOALS

1. Continue to offer USRP internships year-round.
2. Generate the maximum amount of internships with current funding.
3. Enhance communications efforts using a web based approach to attract more students and track program alumni.
4. Improve efficiencies in selection, offers, and acceptance processes using the feedback from current users of the *Connect* system.
5. Implement the use of *Illuminate* distance learning sessions for virtual career fairs and USRP Coordinator training sessions.
6. Select a geographically and institutionally diverse group of interns from a wide array of backgrounds, who are fully representative of U. S. undergraduate students enrolled in STEM majors.
7. Continue to show value in ROI for USRP project outcomes and strengthen data gathering processes to generate more evaluations from NASA mentors.
8. Implement a student stories initiative to capture unique and comprehensive stories of USRP student internship experiences.

## PROJECT BENEFIT TO OUTCOME (1,2, OR 3)

USRP directly addresses NASA Higher Education Outcome 1 and supports NASA Higher Education Outcome 2 of the *NASA Education Strategic Plan*. These outcomes commit the education office to fund programs which (1) contribute to the development of the STEM workforce and (2) attract and retain students in STEM disciplines needed to achieve NASA strategic goals. USRP most directly contributes to NASA Higher Education Outcome 1.2 defined as "Provide NASA competency-building education and research opportunities to individuals to develop qualified undergraduate and graduate students who are prepared for employment in STEM disciplines at NASA, industry, and higher education."

USRP is NASA's largest fully-immersive experiential program for undergraduate STEM students providing experiences spring, summer, and fall. Research shows that one of the best methods of maximizing retention within a field of study is to incorporate experiential opportunities into the traditional course of study. Benefits in terms of retention to graduation, increased capability at graduation, pursuit of advanced degrees, and retention within the career field are well documented. For example, a data set recently presented at the 2007 ASEE Annual Conference showed that undergraduate aerospace engineering students who participated in co-op or internship were retained within the aerospace field at rate 30% higher than students who did not (85% vs. 55%). USRP is continuing to collect metrics to vet this assumption.

The need for increased STEM graduates in the U.S. is well documented. This need is dramatically magnified in the aerospace field. Documentation from the National Aerospace Initiative (2004) shows the average age of the US aerospace workforce at 49. As many reports and studies affirm, the health of the aerospace workforce is directly connected to America's long-term security interests - both economic and defense. USRP is an important contributor in developing NASA's future workforce as well as increasing the size and quality of the overall future aerospace workforce to which NASA and NASA contractors depend. Therefore, USRP internships are an important part of the NASA portfolio of educational projects.

## PROJECT ACCOMPLISHMENTS

*(CONNECTION BACK TO ANNUAL PERFORMANCE GOALS AND PLANS)*

1. Make competitive internship opportunities available year-round (spring, summer and fall sessions).

*In FY10, participants in the Fall 2009 USRP session totaled 91, Spring 2010 USRP internships totaled 99 and Summer USRP internships totaled 113 for a total of 303 internships. Semester internships represented 63% of the total – a 5% increase over 2009.*

2. Generate the maximum amount of internships with reduced funding level of \$2.9 million.

*In FY10, the USRP cooperative agreement was underfunded by \$500,000 and USRP still placed 303 interns. USRP received \$220,840 in additional funding from NASA mentors in FY10 to help supplement some of the missing student slots that normally would have been included under the appropriate funding level indicated on the USRP CAN. This business innovation helped provide an acceptable number of NASA opportunities to undergraduate STEM students in FY10 and indicates the high demand of USRP interns among NASA mentors.*

3. Enhance communications efforts using a web based approach to attract more students and track program alumni.

*In FY10, USRP developed and implemented a unique effort among NASA Higher Education programs - the USRP Alumni Network. The USRP Alumni Network was launched to connect, track and communicate with program alumni more effectively after their completion of the USRP internship program. The USRP Alumni Network includes a total of 227 members within this first year of existence. The network's providing student alumni with a resource to find information on NASA Graduate opportunities, full time positions, as well as provide a place to connect with STEM peers and NASA personnel.*

4. Select a geographically and institutionally diverse group of interns from a wide array of backgrounds, who are fully representative of U. S. undergraduate students enrolled in STEM majors.

*In FY10, a total of 4,562 qualified student applications were received from 1,100 academic institutions. The 303 USRP student interns represented 170 different academic institutions (19 MSI's, 39 from EPSCORE states), 44 states, and Puerto Rico. Of the participants:*

- *72% were engineering majors, 33% science, and 20% math/computer science.*
- *67% of USRP interns had a GPA above 3.6/4.0.*
- *Of the 303 interns: 40% were underserved/underrepresented*
  - *15% were targeted minority and 27% were female.*
  - *24% represent Institutions from EPSCORE states*

5. Implement a student stories initiative to capture unique and comprehensive stories of USRP student internship experiences.

*In FY10, USRP implemented an initiative to capture more student stories through articles, press releases and video testimonials. USRP News and feature Video content sections were developed and made live on the USRP website. USRP developed and published 38 articles, and 3 completed student and mentor testimonial videos in FY10. As of late September, 2010, these videos have received 1,000 views on Youtube.*

6. Continue to show ROI for USRP project outcomes and strengthen data gathering processes to capture more detailed information on project outcomes.

*Revised student and mentor surveys incorporated into the USRP Connect database system in FY09 better define the learning outcomes in terms of ABET accreditation criteria, rigorously define areas of student professional growth, and rigorously capture the full value of project return on investment (ROI) for the agency. In FY10, USRP continued this effort. The statistics below are based on 251 completed student surveys.*

### **1. USRP student learning in ABET a-k accreditation criteria:**

The following questions in USRP student surveys are designed to document whether USRP internship experiences generate growth in key areas of learning identified by ABET, the Accrediting Body for Engineering Education. These areas are listed below along with the percentage of students (based on 252 student surveys) who indicated they experienced growth in these areas as a result of their USRP internship experience:

Professional/Technical Communication <i>(Speaking, writing, presenting, listening and questioning)</i>	97%
Conceptual/Analytical Ability <i>(Evaluating situations, solving problems, identifying/suggesting new ideas)</i>	98%
Learning/Applying Knowledge <i>(Learning new material, accessing/applying specialized or classroom knowledge)</i>	98%
Technology <i>(Using /tools/instruments/information, understanding complex systems and interrelationships)</i>	96%
Work Culture <i>(Understanding/working within the group culture, respecting diversity, recognizing implications of actions)</i>	99%
Organization/Planning <i>(Managing resources, setting goals, prioritizing, managing multiple tasks and meeting deadlines)</i>	96%

### **2. Immediate Return on Investment (ROI) Measures:**

In FY10, the USRP surveys included questions designed to capture immediate outcomes normally associated with internship programs.

A) The overall value of the internship experience to the students:

*Students were asked to quantify the value of their USRP internship compared to a typical semester at their college or university. Based on student responses, the total credit hour equivalent of learning generated by USRP in FY10 is 4,300 credit hours or, 14.1 cr. hrs./internship.*

B) The overall value of the productivity of the interns toward the mission of the NASA mentors:

*When asked to compare the productivity of the USRP interns to a typical new hire in their organization, NASA mentors rated the interns, on average, as slightly more productive (1.02).*

*This generates an equivalent of 84 FTE. Using an estimated starting salary (including benefits) for recently graduated technical personnel of \$75,000/year, the dollar value of the total ROI productivity of USRP student interns in FY10 is estimated to be \$6.3 Million.*

### **3. Attitudinal Changes Reported by Students:**

Not only do internships build core competencies such as those tied to the ABET a-k criteria; they also affect student perceptions, commitment, confidence, and future goals. This “affective learning” was captured in a series of survey questions. This data demonstrates the positive effect *USRP* internships have on the commitment of students to STEM degrees and careers.

The following data shows the percentage of *USRP* interns (based on 252 student surveys) who stated that their *USRP* internship experience:

Helped determine my professional strength/weaknesses	98%
Increased my professional self-confidence	98%
Increased my academic motivation	96%
Increased my commitment to a STEM career	95%
Improved my understanding of chosen field	95%
Helped clarify my career path	97%
Helped prepare me to achieve my career goals	97%

## **PROJECT CONTRIBUTIONS TO PAR MEASURES (INCLUDE DATA PLUS EXPLANATION)**

### **NASA Higher Education Outcome 1.2: Impact on academic and career goals**

PAR data are reported one year later in order to allow a significant percentage of participants to reach their expected graduation date. *USRP* participants scheduled to graduate in FY2010 were surveyed to determine whether or not they remained in the STEM pipeline after graduation. In total, *USRP* PAR data for FY10 indicates 98% of respondents were retained in the STEM pipeline at the time of survey. These results exceed all goals for Outcome 1.2.

Alumni responses can be further broken down as follows:

*Of the 131 responses to this survey, 100% either graduated or remained in their STEM BS degree program. Of the 90 STEM graduates, 54% responded that they were pursuing an advanced STEM degree. Of the remaining graduates who chose not to pursue graduate degrees, 15% indicated they were employed specifically by NASA, 72.5% were employed in the aerospace-related workforce (including academia), and 97.5% indicated they were employed in the overall STEM workforce.*

## **IMPROVEMENTS (e.g., project management, efficiencies, etc.) MADE IN THE PAST YEAR**

1. Leveraged funding from NASA technical organizations.  
*Generated an additional 5 internships from ESMD and 26 internships from other NASA technical organizations.*
2. Continued improvements and efficiencies in selection, offers, and acceptance processes.  
*Mentor and student survey results indicate that web-based selection and placement tools and procedures are resulting in a high level of satisfaction in the matching of student interns and*

*NASA mentors. When asked, “was this student intern a good match for your project?”, NASA mentors responded with an excellent or very good rating (4 or 5 on 5 pt Lickert Scale) 85% of the time with 96% giving a positive response (3+ on 5 pt Lickert Scale).*

*This high level of matching directly leads to high levels of satisfaction in the overall internship experience for the student interns. Student satisfaction ratings of their overall internship experience averaged a very strong 4.6/5.00. 68% of students rated their internship experience “excellent” (5 on 5 pnt Lickert Scale), 92% rated it “good” or better (4 or 5 on that scale), and 99% rated their experience positively (3, 4, or 5 on the 5-pt scale).*

## **PROJECT PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION (THIS IS WHERE FURTHER FOLLOW-UP TO OCCUR FOR COLLECTING 2010 GRANTEE PERFORMANCE SUMMARIES FOR PUBLISHING TO OUR EDUCATION HOME PAGE)**

In FY10, *USRP* continued its partnerships with ESMD, University of Texas Pan American (UTPA and HESTEC), and Universities Space Research Association Council of 104 Space-related Institutions. *USRP* also expanded its contacts and material distribution with American Association of Community Colleges and NASA Space Grant. The goal of these targeted partnerships (and others to follow) is to widen the *USRP* opportunity dissemination points resulting in a larger, more diverse pool of highly qualified participants.