

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

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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 seeks applications from undergraduates enrolled full-time in an accredited U.S. college or university. 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 2009 PROJECT GOALS

1. Continue to offer USRP internships year-round.
2. Generate a minimum of 309 student internships.
3. Enhance the 100% web-based application process using the feedback from the *Connect On-line* application.
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. Adjust evaluation instruments to capture more detailed information on project outcomes.

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 I internship opportunities available year-round (spring, summer and fall sessions).

In FY09, participants in the Fall 2008 USRP session totaled 97, Spring 2009 USRP internships totaled 106 and Summer USRP internships totaled 146 for a total of 349 internships. Semester internships represented 58% of the total – a 9% increase over 2008.

2. Generate a minimum of 309 student internship experiences (as per the USRA proposal).

Overall, the 10 NASA Centers and 2 NASA Research Facilities hosted 349 USRP interns in FY2009. This represents an overall increase of 9% from the 2008 level of 319 students, 40 more than the FY09 goal of 309 (as per the USRA proposal).

3. 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 FY09, a total of 3,140 qualified student applications were received from 930 academic institutions. The 349 USRP student intern participants represented 204 different academic institutions, 43 states, and Puerto Rico.

- *86% of the participants were upperclassmen (juniors and seniors).*
- *60% were engineering majors, 22% science, and 18% math/computer science.*
- *57% of USRP interns had a GPA above 3.6/4.0.*
- *Of the 349 interns: 20% were minority and 25% were female.*

4. Strengthen evaluation instruments to capture more detailed information on project outcomes.

In FY09 student and mentor surveys were incorporated into the USRP Connect database system. These surveys, were revised at the end of FY08 to better define the learning outcomes in terms of ABET accreditation criteria, more rigorously define areas of student professional growth, and to more rigorously capture the full value of project return on investment (ROI) for the agency. The statistics below are based on 256 completed surveys.

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

Several questions were added to USRP student surveys to determine whether USRP internship experiences generated growth in several key areas of learning identified by ABET, the Accrediting Body for Engineering Education. These areas are listed below along with the percentage of students who indicated they experienced growth in these areas as a result of their USRP internship experience:

Professional/Technical Communication (Speaking, writing, presenting, listening and questioning)	98%
Conceptual/Analytical Ability (Evaluating situations, solving problems, identifying/suggesting new ideas)	98%
Learning/Applying Knowledge (Learning new material, accessing/applying specialized or classroom knowledge)	98%

Technology (Using /tools/instruments/information, understanding complex systems and interrelationships)	98%
Work Culture (Understanding/working within the group culture, respecting diversity, recognizing implications of actions)	96%
Organization/Planning (Managing resources, setting goals, prioritizing, managing multiple tasks and meeting deadlines)	97%

2. Immediate Return on Investment (ROI) Measures:

In FY09, the *USRP* mentor 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 FY09 is 5700 credit hours (16.3 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 (1.05). Using an estimated starting salary (including benefits) for recently graduated technical personnel of \$70,000/year, the dollar value of the total ROI productivity of the 349 USRP student interns in 2009 is estimated to be \$7 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 who stated that their *USRP* internship experience:

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

PROJECT CONTRIBUTIONS TO PART MEASURES (INCLUDE DATA PLUS EXPLANATION)

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

PARTS 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 FY2008 were surveyed to determine whether or not they remained in the STEM pipeline after graduation. Of the 60 responses to this survey, 54% responded that they were pursuing an advanced STEM degree, 8% indicated they were employed by NASA, 17% were employed in the aerospace field, and 17% in other STEM fields. In total, 88% of the respondents were

pursuing advanced STEM degrees or employed in STEM fields. Additionally, 7% indicated they were currently seeking STEM-related employment.

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

1. Leveraged funding from NASA technical organizations.

Generated an additional 14 internships from ESMD.

2. Improve efficiencies in selection, offers, and acceptance processes.

Mentor and student survey results indicate that new 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 exceptional rating 89%, and above average rating 8%.

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 4.58/5.00 – an increase of 0.09 from FY2008.

PROJECT PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION (THIS IS WHERE FURTHER FOLLOW-UP TO OCCUR FOR COLLECTING 2008 GRANTEE PERFORMANCE SUMMARIES FOR PUBLISHING TO OUR EDUCATION HOME PAGE)

In FY09, 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.