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**EVALUATIVE ASSESSMENT FOR NASA/GSFC  
EQUAL OPPORTUNITY PROGRAMS OFFICE SPONSORED PROGRAMS**

**CAPITOL COLLEGE  
PRE-COLLEGE MINORITY ENGINEERING PROGRAM**

**CONDUCTED**

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**PREPARED BY**

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## PROGRAM EVALUATION INSTRUMENT

### **I. Why was the Pre-College Minority Engineering Program (PREP) developed? What is the problem or need it is attempting to assess?**

The purpose of PREP is to upgrade skills of minority students who have shown an interest in pursuing academic degrees in electrical engineering. The goal is to upgrade skills needed for successful completion of the rigorous curriculum leading to a Bachelor of Science degree in engineering through a comprehensive upgrade of academic, study and interpersonal skills.

#### **Under-representation of Minorities in Engineering**

Engineering and related high-tech fields continue to provide excellent job opportunities to those who have the appropriate education. Over 1,000 high-tech companies are located in the State of Maryland. They provide 7.3 percent of the state's employment base and salaries that are 62.1 percent above the average of all industries. (*Warfield's Business Record, November 1995*)

However, minorities continue to be under-represented in engineering programs. The latest figures from the National Science Foundation show that 16 percent of U.S. citizens who were enrolled in engineering programs in 1992 were minorities. However, blacks, Hispanics, and American Indians continue to be seriously under-represented at only 9 percent of the total enrollment. This, of course, affects degrees awarded in the field. Between 1981 and 1991, the number of bachelor's degrees earned by under-represented minorities in non-science and non-engineering fields increased 34 percent. By comparison, the number of engineering bachelor's degrees earned by under-represented minorities grew to 10 percent in 1991.

The proportion of minorities in the population often differs significantly from the proportion of science and engineering degrees they earn. Asians, who constituted 3 percent of the population according to the 1990 census data, earned 6 percent of science and engineering baccalaureate degrees in 1991. Blacks were almost 12 percent of the population and earned 6 percent of the degrees; Hispanics were 9 percent of the population and earned 5 percent of the degrees; and American Indians were under 1 percent of the population and earned only 0.4 percent of the degrees. A follow-up study showed that although the enrollment of minority students in engineering grew by almost 60 percent during the period of 1986-1992, during the fall of 1993 the number of minority freshmen decreased over 5 percent. African Americans, Hispanics and American Indians now comprise 28 percent of the college-age population but account for less than 8 percent of the graduates receiving Bachelor of Science degrees in engineering in 1993, a decrease from the 1991 rate. (*Women, Minorities, and Persons with Disabilities in Science and Engineering: 1994, National Science Foundation, 1995*)

Attrition continues to be a serious problem for under-represented minorities. "When first-year enrollment figures are compared to graduation figures four years later, there is a large

percentage drop for all of the under-represented groups. For example, under-represented minorities made up 12.6 percent of the first year students in the fall of 1988 but received only 8 percent of the bachelor's degrees in engineering in 1992. Rough indicators of attrition show that for all engineering students, a 37 percent loss is indicated. African Americans lost 66 percent; Hispanic Americans lost 49 percent and Native Americans lost 74 percent." (Source: *Manpower Comments, September 1993*)

The American College Testing Program report of January 1991 on "Equity of Higher Educational Opportunity for Women, Black, Hispanic, and Low Income Students" reinforces the conclusion that college-completion rates of rich and poor students are continuing to widen. In 1979, the wealthier student was only four times as likely to earn a degree, but by 1987 the wealthier student's chance of getting a degree had increased to 12 times that of the poorer student. The study's main conclusion was that "*the goal of equity of higher educational opportunity for all Americans that was partly achieved by the second half of the 1970s has been largely lost for Blacks, Mexican-Americans, and those from low family income backgrounds during the 1980s.*"

### **Need for Minority Participation in the Technological Workforce**

A study by George Campbell, Jr. in the June 1, 1994 issue of *The Chronicle of Higher Education* concluded that significant progress has been made in increasing the number of minority engineering students during the past two decades. However, minorities remain under-represented in engineering. Campbell concludes that efforts to recruit minorities into engineering must continue unabated. Careers in engineering still offer minority students the potential for good, high-paying careers. Despite reductions in the engineering job force, the unemployment rate for engineers dropped to 2.6 percent in the last quarter of 1994 (*CPST Comments, June 1995*). At the same time the market for bachelor's level engineers has continued to improve. In fact, engineering graduates are in relatively high demand. Bachelors degree candidates with technical majors experienced excellent opportunities for 1995 graduates. Almost 45 percent of the job offers to the Class of 1995 was for this group (*CPST Comments, November 1995*). Traditional large companies have downsized but small start-up companies have generated thousands of new jobs. "Effective programs to recruit minority group students into engineering need to be strengthened, not abolished. We must utilize the full potential of every segment of our society," said Campbell.

## **2. What are the measurable outcomes of your project? What is the expected impact of the project in the short and long term?**

### **Goals**

The Capitol College Pre-College Minority Engineering Program has been designed to prepare and motivate minority high school graduates for the rigors demanded by undergraduate studies leading to degrees in the engineering profession. The purpose of the program is to upgrade skills of minority

students who have shown an interest in pursuing a Bachelor of Science degree in electrical engineering. Participants are selected who, because of academic deficiencies, are at-risk college degree candidates. The program involves a comprehensive effort to upgrade academic skills, study skills, and interpersonal skills. The goal is to lay the foundation for successful completion of the rigorous curriculum leading to a Bachelor of Science degree in engineering.

**Program Objectives in Relation to NASA Minority University Research and Education Division's (MURED) Pre-college Education Outreach Program**

1. Strengthen academic, study and interpersonal skills of minority students who are interested in pursuing a Bachelor of Science degree in electrical engineering. This corresponds with MURED Objectives a and c.
2. Increase the number of minority students who are prepared for the rigorous demands of undergraduate studies leading to an engineering degree. This corresponds with MURED Objectives a and c.
3. Increase the retention rate of minority students who are pursuing engineering degrees. This corresponds with MURED Objectives a and c.
4. Heighten students' awareness, interest, and understanding of engineering and technology and the academic preparation necessary to achieve these objectives. This corresponds with MURED Objective b.
5. Help students' career development, raise their consciousness of the diverse opportunities available to Bachelor of Science in electrical engineering degree holders, and provide minority role models. This corresponds with MURED Objective b.
6. Prepare students to start the normal series of entry-level engineering courses during their freshman year. This corresponds with MURED Objective a.

**3. Clearly and concisely describe the activities supported under the project. Indicate unique aspects of this project's approach, and describe how the project activities are integrated into existing programs within your institution (include any interaction with other federal or state funded projects).**

**Overview**

NASA/PREP is a six-week program designed to strengthen the academic, study, and interpersonal skills of minority students who are interested in pursuing a Bachelor of Science degree in electrical

engineering (BSEE). Its goal is to lay the foundation for the rigorous curriculum required for a BSEE. The program is total immersion, Monday to Thursday, from 8 a.m. to 10 pm., with field trips on Friday. All students are expected to live in the dormitories during the week, but go home on Friday evenings and return to campus by 8 p.m. on Sundays.

### **Curriculum**

The six components of the program include skill building, mathematics, English, electronics, computers, and group dynamics. A team of faculty members develop and coordinate the program. Every student is mentored by a team member throughout the program. Team members are selected who are approachable, sensitive, willing to spend time with students, and possess clear communications skills. Testing and evaluation components are built into each program segment. The faculty team and resident assistants meet each Friday to discuss problems, assess student strengths and weaknesses, and results of knowledge checks.

### **Enrichment Program**

Several excursions are planned to raise students' consciousness regarding career opportunities in the field of engineering. Historically, these trips have included a visit to NASA Goddard Space Flight Center and visits to several local employers such as the National Institute for Standards and Technology, MCI Corporation, and Oceanering Technologies. Cultural enrichment trips include points of interest in Baltimore and Washington, DC.

### **Motivational Speakers and Role Models**

An extensive program of speakers and role models has been developed. The program begins at the first evening when students and parents arrive for a BBQ and short program designed to introduce participants to one another and the program goals and objectives. NASA program coordinators, speakers, and student interns are an integral part of the agenda and provide students with motivation to study hard and succeed. A Wednesday night speakers series brings Capitol minority alumni and NASA engineers to discuss their educational and professional experiences and the many obstacles they had to overcome en route to their present status. NASA representatives also speak at the graduation exercises held at the conclusion of the program.

### **Articulation With Electrical Engineering Program**

Upon successful completion of the pre-college program, students will be prepared to start the normal series of entry-level engineering courses, including: College English I, Pascal Programming, Introduction to Circuit Analysis, Calculus I, and Introduction to Sociology.

### **Interaction with other Federal or State Funded Projects**

There is no interaction with other federal or state funded projects.

#### **4. Detail techniques within the project that promote parent involvement, if applicable.**

The PREP faculty met at the end of the summer of 1994 to evaluate the program and make suggestions for strengthening it in the future. It was felt parents should be more directly involved in the admissions process so the program goals and expectations of participants would be clearly understood by the entire family. Based on this a two-day admissions process was developed where, starting in the summer of 1995, the first day was devoted to pre-interview meetings with parents and students to discuss the program, curriculum, schedule and requirements. In addition, parents are encouraged to participate in the welcome program, held the initial Sunday night of the program, which is designed to discuss the program goals and objectives as well as to introduce participants to one another. NASA officials are always invited to the welcome program to talk about how the program interfaces with NASA Goddard.

#### **5. How are the former participants tracked and for how long is their progress monitored? Please provide the format.**

PREP graduates who attend Capitol College are followed closely via several mechanisms throughout their academic program of study. Academic progress, career development, and financial aid are all tracked throughout the students stay at Capitol College. Following receipt of their Bachelor of Science degrees PREP students, as Capitol College alumni, will be followed closely for the foreseeable future via an on-going program of alumni surveys. Academic progress is monitored by the Retention Committee, each student's academic advisor, the Vice President for Academic Affairs and the Vice President for Institutional Advancement. Students who are identified by the Retention Committee as having academic problems are immediately contacted by their academic advisors to discuss the causes of the problems and to encourage students to work with the Tutoring Resource Center for help. The Director of Career Services works closely with students regarding opportunities for part-time work, coop placements, and internships. The Director of Student Development tracks students regarding personal problems and counseling needs. Those on financial aid are also closely watched by the Director of Financial Aid who works with students to address their financial needs and monitors students to ensure they meet the criteria for maintaining financial aid.

The academic progress of PREP graduates who did not elect to attend Capitol College will be tracked via a program of phone surveys conducted by the Director of Student Development until they graduate from college and are placed in a job.

#### **6. Describe database elements and evaluation activities that are used to monitor and assess progress under the program.**

The following database elements and evaluation activities are used to monitor and assess PREP student's progress:

- Successful completion of the PREP program

- Recommendation for entry into the electrical engineering program
- Academic major
- College attendance
- Grades at the end of each semester
- Suitable progress if recommended for help at the Tutoring Resource Center
- Work experiences, coops, and internships during student years
- Job placement upon receipt of Bachelor of Science degree
- Graduate school experience
- Career progress as a working professional engineer

**7. What strategies do you have in place to ensure that the project's stakeholders (those individuals, groups or organizations who will be impacted by or will likely be interested in its success) are involved in its planning?**

The PREP faculty and the Director of Student Development meet regularly throughout the summer to discuss participants progress and make program adjustments as needed. At the end of the summer they meet to evaluate the program in depth. Suggestions made at that time are incorporated into the following year's program. In addition, mentors for each PREP class are selected from previous PREP participants. These mentors help plan activities for the students throughout the summer.

**8. Who are the key personnel involved in your project? Indicate ethnic identification (optional).**

Key personnel include:

- The admissions counselor in charge of the recruiting and selection process (African American)
- The admissions committee consisted of two white females, 1 white male, and 1 African American male
- In the spring of each year faculty are selected to teach six academic sections for PREP. Last summer the faculty consisted of 2 white women who taught 3 different sections, an Asian man who taught 2 sections, 1 white male who taught one half of a section, 1 African American male who taught the other half of the section
- The Program Coordinator in charge of overseeing the program administration during the summer is the Director of Student Development. The director for the first four years was a white male. He has now resigned and has been replaced by an African American female.
- The overall Program Administrator is the Vice President for Institutional Advancement, a white female.
- The administrative contact and trouble shooter for the program is the Vice President for Academic Affairs, a white male.
- Three mentors are in charge of supervising the evening activities of students, including study hall, the Wednesday night speaker series. They also participate in field trips and coordinate

the dormitory experience. All are graduates of PREP.

- The Resident Director for the dormitories is an African American woman.
- The college's food service, which provides all the meals for the PREP students during the summer, is run by two African American women.

**9. Describe the dissemination networks and strategies utilized during the past year(s); (i.e., information, materials, methodologies, publications/products).**

Publicity is targeted to prospects in the Baltimore/Washington region. This includes a comprehensive program of personal visits to high schools, personal contacts with organizations which promote college opportunities to minority students, news releases to local newspapers, and mailings to high schools, churches, and high school students interested in electrical engineering. Appendix 1 contains the recruiting flier for the PREP Class of 1995.

An admissions staff member personally visits the following high schools, selected on the basis of a history of a high number of applications to PREP and to Capitol College, to promote the Pre-College Minority Engineering Program:

Baltimore City College HS	Baltimore County
Baltimore Polytech	Baltimore County
DeMatha	Prince George's County
Dunbar	Washington, DC,
Eleanor Roosevelt	Prince George's County
High Point	Prince George's County
Montgomery Blair	Montgomery County
Randalstown	Baltimore County
Watkins Mill	Montgomery County
Western	Baltimore
Wheaton	Montgomery

Approximately 50 additional high schools receive information about the program during a personal visit from an admissions staff member during guidance visits scheduled for the spring of 1996. In addition, Capitol College admissions staff distributes program information at 8-10 high school college fairs. The program is publicized at the two Capitol College Open Houses scheduled for November and April of each year.

Several local people and organizations which promote college opportunities to minority students are visited. These include Joe Fisher, President of First Generation College Bound in Laurel, Maryland; Caryne Forster, Prince George's County Council of PTA's College and Career Preparation Committee Chairperson; and advisors of Baltimore City's College Bound Foundation.



The Office of Institutional Advancement widely promotes PREP through a series of press releases about individual student participants, student field trips and the overall program. Often these press releases are jointly written by Capitol College and the Office of the Prince George's County Executive. PREP is regularly featured in the Capitol College News, the college's newsletter, and the Capitol College Circuit, which is devoted to on-campus news.

The Vice President for Institutional Advancement has been the featured speaker at the Maryland Association of Higher Education on the topic of PREP.

#### **10. What are your program milestones? Give specifics.**

For the past four summers, since the summer of 1992, the National Aeronautical and Space Administration funded PREP. Ten minority students from the Washington/Baltimore region who had just graduated from high school completed the program each summer, resulting in a total of 40 graduates. As of fall 1995, 36 of the 40 are now enrolled in engineering science or math programs at institutions of higher education; 21 of these students at Capitol College. The PREP Class of 1995 is off to an excellent start with fine academic results during their first semester of study. Five had averages above 3.0 while the other five had averages of 2.0 or above. All are majoring in an area of engineering or engineering technology. A complete report on all of the PREP classes will be sent to NASA Goddard at the conclusion of the 1996 spring semester.

Student feedback and evaluation of the program shows the students felt they were better prepared to enter college as a result of the six weeks they spent at Capitol College. Typical comments from the class of 1995 at the end of their first semester were, "The program helped me a lot. It got me motivated for the fall and I was able to sustain this throughout the semester," "I learned a lot from the program. It enabled me to become a better writer." In addition, comparisons of placement tests (pre-tests) in English and math with final tests, clearly showed improvement was the norm for all students. Detailed evaluations of the results of the PREP programs have been sent to NASA at the conclusion of each program and at the end of each academic semester.

During the summer of 1995, for the first time, three PREP graduates worked on-site at the NASA Goddard Space Flight Center through the NASA internship program. Two, Racquel Massey and Greg Ware, were members of the PREP Class of 1993 and had just completed their sophomore years. The third, David Brown who was a member of the Class of 1992, had just completed his junior year. He expects to graduate with a Bachelor of Science degree in electrical engineering in August of 1996. He now is applying to graduate school at Loyola University and the Johns Hopkins University. This semester he has been working as a co-op student at the Food and Drug Administration's electro-optics laboratory. He will be looking for full-time work after May because he will need to take only two classes in the summer.

Several other PREP students now are working in co-op positions. The following are some examples:

- Racquel Massey, who served as a NASA intern during the summer of 1995, has been

working in the Capitol College computer laboratory assisting other students with software questions. She currently is in the co-op referral system and will be interviewing at several companies for a co-op position for the spring.

- DeWayne Reed is working as a network support technician for SAIC supporting a network at the Nuclear Regulatory Commission in Rockville, MD. He was working full time and taking classes part time during the 1995 fall semester. He has since reduced his work hours to devote more time to his studies.
- Alfonzo Thomas worked as a contract employee to an engineer who needed him to research information on the Internet. He gained so much experience that he has now designed his own Home Page (<http://www.geocities.com/capitolh/n/2901/>).

The NASA PREP 1995 program was held from June 25-August 4. The Class of 1995 consisted of ten students: five men and five women. The students came from Maryland, the District of Columbia, Pennsylvania, and New York.

#### **11. What project component(s) do you believe will have the greatest positive impact?**

The project components that we believe will have the greatest positive impact are threefold. The first is the program's depth and intensity. Students are together in supervised academic activities from 8 a.m. through 10 p.m. This deep immersion in their studies is designed to teach them that engineering is a rigorous academic field that will demand their concentration, time and energies throughout their academic program of study. It also is designed to build a core group that is close and will provide a support system throughout their student years. Another vital project component is that Capitol College has a faculty and staff who are very caring and nurturing. They know each student, try to address their needs, and work hard to ensure the success of each and every student. A third important project component is the self-selection process inherent in a six-week total immersion summer program. PREP students choose to give up their summer to pursue their academic interests while many of their friends are spending the summer at the beach or in a similar pursuit. PREP covers the essential academic components necessary to begin a program of study for electrical engineering. This provides students with an excellent background for success in their college studies.

#### **12. Show evidence of a systematic approach to developing a support base to continue project activities beyond NASA funding period.**

We have applied for and obtained external funding for the program, targeted at providing scholarship support specifically for PREP students. Donors who have provided support for this purpose include Litton Industries, the Ghosh family, and the Baltimore-Washington Corridor Chamber of Commerce Foundation.

