

# **MUREP COMMUNITY COLLEGE CURRICULUM IMPROVEMENT (MC3I)**

## **FY 2016 ANNUAL PERFORMANCE REPORT**

### **FUNDING SOURCE:**

OFFICE OF EDUCATION  
MINORITY UNIVERSITY RESEARCH AND  
EDUCATION PROJECT (MUREP)

### **LINE OF BUSINESS:**

INSTITUTIONAL ENGAGEMENT

### **MANAGING ORGANIZATION:**

NASA JET PROPULSION LABORATORY

### **ACTIVITY MANAGER:**

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## **ACTIVITY DESCRIPTION**

NASA provides financial assistance (grants and cooperative agreements) to the Nation's Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), Asian American and Native American Pacific Islander-Serving Institutions (AANAPISIs), Tribal Colleges and Universities (TCUs), American Indian and Alaskan Native Serving Institutions (AIANSIs), Predominantly Black Institutions (PBIs) and eligible community colleges. The Administration recognizes the valuable role that these institutions play in educating our citizens, as reflected in the five Minority-Serving Institutions (MSI) focused Executive Orders signed by the President.

NASA's Minority University Research and Education Activity (MUREP) investments enhance the research, academic, and technology capabilities of MSIs through multi-year awards. Awards assist faculty and students in research and provide authentic STEM engagement related to NASA missions. These competitive awards provide NASA specific knowledge and skills to learners who have been historically underrepresented and underserved in STEM. MUREP investments also assist NASA in meeting the goal of a diverse workforce through student participation in internships, scholarships, and fellowships at NASA Centers and JPL.

In an effort by the NASA Office of Education to create efficiencies, the Curriculum Improvement Partnership Award for the Integration of Research (CIPAIR) was consolidated into MUREP as the MUREP Community College Curriculum Improvement (MC3I) activity. The MC3I activity assists minority-serving institutions with strengthening their science, technology, engineering and mathematics (STEM) academic fields and technical programs. Funding is used to increase the quantity and quality of STEM curricula, the number of underrepresented and underserved students who attain STEM degrees, and the number of underrepresented and underserved students who choose careers in NASA-related fields. Examples of funded activities include: engaging students and faculty in research at NASA Centers and facilities; building alliances/partnerships between community colleges and research universities to enhance the availability of research experiences and ease the transition of students from two- to four-year institutions; and providing MSI faculty with professional development and training to teach STEM courses.

## **ACTIVITY GOALS**

The primary goals of MC3I are to:

- increase the number of STEM courses and curricular pathways infused with NASA content that are available at Minority Serving Community Colleges (MSCCs);
- attract, retain, and support the success of students in STEM degree programs, and subsequently in NASA-related careers; and
- increase the number of students who complete STEM certificates/degrees from backgrounds that are historically underrepresented in STEM.

These goals are addressed through the following objectives:

- Development of curriculum improvements in STEM vocational certificate programs, AA/AS degree programs, and/or transfer programs
- Expansion of the STEM pipeline through the development of new or existing high school partnerships
- Development and expansion of curricular options in engineering

## **ACTIVITY BENEFIT TO PERFORMANCE GOALS**

MC3I directly addresses Annual Performance Goal 2.4.1 (*Assure that students participating in NASA higher education projects are representative of the diversity of the Nation.*) of the NASA education strategic plan. Additionally, MC3I contributes to the national agenda for STEM with a focus on the community college STEM pipeline. MC3I institutions have continued to promote a number of the “Elements of Successful STEM Education Programs,” described in the President’s Council of Advisors on Science and Technology, *Engage to Excel: Producing One Million Additional College Graduates with Degrees in Science, Technology, Engineering, and Mathematics (STEM)*.

Successful MC3I-supported activities have contributed to performance measures and CoSTEM priorities as follows:

- **FY2016 active MC3I partnerships included 6 Minority Serving Institutions (MSIs)**
  - **Of the 6 MSIs, 3 are HSIs/AANAPISIs; 2 are HSIs; and 1 is a PBI**
  - **Representation of 5 community colleges or two-year institutions**
- **Of the 42 students enrolled in new and/or revised courses in FY2016, 76% (n=32) students reported membership in an underrepresented minority group.**
  - **28 African American (66.6%); 4 Hispanic (9.5%)**
  - **36 male (85.7%) and 6 (14.3%) female**
- **Of the 14 students who received significant support as summer interns, 43% (n=6) reported membership in an underrepresented minority group (n=6 Hispanic).**
- **A total of 63 additional students received direct funding in the amount of \$400-\$2,500. Of these students, 62% reported membership in an underrepresented minority group.**
  - **19 African American (30%); 6 Hispanic (9.5%)**
  - **49 male (77.7%); 14 female (22%)**

## **ACTIVITY ACCOMPLISHMENTS**

Four new campuses commenced Year 1 of activities under MC3I during FY16: Baltimore City Community College (BCCC), Napa Valley College (NVC), Queensborough Community College (QCC), and Santa Monica College (SMC). These campuses, along with the California State University, San Bernardino/College of the Desert (CSUSB/COD) partnership reported the following noteworthy activities:

### **California State University, San Bernardino/College of the Desert**

- The no-cost extension supported research experiences and materials for two undergraduate STEM majors at NASA Armstrong during Summer 2016.

### **Baltimore City Community College**

- The project team worked with Baltimore City Public School System (BCPSS) to develop an Engineering Articulation Agreement between BCCC Engineering/Robotics Programs and BCPSS Project Lead the Way (PLTW). The draft articulation has been submitted to both BCCC’s articulation office and BCPSS. Once this articulation is implemented, it will help recruit all BCPSS PLTW students into BCCC STEM programs. In Fall 2016, the project team also sent 2 BCCC robotics students to serve as advisors to BCPSS High School Robotics Teams.
- In Spring and Summer 2016, the BCCC project team developed Weekend Robotics/Electrical Engineering Open Labs to enable all engineering/robotics students to develop skills in cutting-edge technologies. As of Fall 2016, Weekend Robotics/Electrical Engineering Open Labs are offered on

weekends so that students may use the existing robotics equipment, complete lab assignments/reports, and communicate with professors/tutors.

- The BCCC project team established a Mini Math/English Library at the Maryland Center for Veterans Education and Training (MCVET) for veterans to review course materials and prepare for Accuplacer tests. As a result, two veterans at MCVET enrolled in BCCC STEM programs.
- In March 2016, a total of 35 students visited NASA's Goddard Space Flight Center. NASA Goddard Center has agreed to reserve three 2017 summer intern placements for BCCC students.
- Three courses (EGN 101 Engineering Graphics, PHY 203 Calculus-based Physics, and RBT 101 Introduction to Robotics/Mechatronics) have been revised to include Hubble Telescope content. NASA Goddard Subject Matter Experts met with the BCCC project team several times to collaborate on course revisions.

### **Napa Valley College**

- Course curriculum on rocketry, electronic payloads, drone building and flight was developed in partnership with Sonoma State University and California State University, Fresno. Course outlines were submitted for approval at five Minority Serving Community Colleges (MSCCs) in California—College of San Mateo, Irvine Valley College, Los Angeles City College, Napa Valley College, and Reedley College. Instructors from these campuses were trained in the curriculum in Summer 2016. The curriculum will be used at 10 MSCCs in California by the end of the performance period.
- Two undergraduates from Napa Valley and Reedley Colleges were placed at NASA Armstrong for summer research experiences. Additional students will be hosted in the summers of 2017 and 2018. NASA Armstrong also provided input on the curriculum development and provided videos to be used in the courses.

### **Queensborough Community College**

- An Introduction to Space Weather course is currently being developed and will be offered beginning in Fall 2017.
- Space weather modules are also being developed and will be incorporated into two courses in Fall 2017: 1) Astronomy, and 2) Natural Hazards.
- NASA Goddard scientists and CUNY/City College of New York faculty hosted students for research experiences in Summer 2016. Six students will be presenting their research at the 2016 Fall meeting of the American Geophysical Union in San Francisco. Eleven students will present their research at the Undergraduate Research Day at QCC in Fall 2016.

### **Santa Monica College**

- Three NASA/STEM-related courses were approved by the college curriculum committee: 1) Exploration of the Solar System (GEOL/ASTRON 10); 2) Engineering Graphics and Design (ENGR 11); 3) Circuit Analysis (ENGR 21) and Circuit Analysis Lab (ENGR 22).
- Nine students and one faculty member participated in summer research internships at the NASA Jet Propulsion Laboratory in Summer 2016. Five SMC students were involved in the design of a cubesat mission for Project Endor at the University of Southern California. Four SMC students are involved in ongoing research (ELFIN Project) at UCLA.
- Hafeedh Herichi (PI) completed the "Teaching Men of Color in the Community College" online training. The remainder of the project faculty and staff are planning to participate in Equity Summit (Winter), Faculty Summer Institute, and conferences to increase awareness of issues facing underrepresented students.

## **ACTIVITY CONTRIBUTION TO ANNUAL PERFORMANCE INDICATORS (APIs)**

As a higher education-focused activity within MUREP, MC3I is responsible for reporting data from FY2016 during this reporting call **that address ED-16-1:**

- **3 revised or new NASA-related STEM courses offered during FY2016; 17 revised or new courses in development or pending campus approval for enrollment in FY2017**
- **42 total course enrollment in 3 revised/new NASA-related offerings**
- **14 students engaged in summer internships at NASA Armstrong Flight Research Center, NASA Jet Propulsion Laboratory, and major research universities**

## **ACTIVITY IMPROVEMENTS MADE IN THE PAST YEAR**

During the span of the activity, MC3I has incorporated several strategies for institutional and research building capacity, including but not limited to the following:

- Involving students and faculty in NASA-related STEM research at NASA Centers.
- Building alliances/partnerships between community colleges and research universities to enhance the availability of research experiences to students at community colleges and ease their potential transitions from two- to four-year institutions.
- Providing mentoring through role models of diverse backgrounds to inspire students and help them excel in STEM subjects.
- Providing faculty with profession development and training to teach STEM courses, through summer institutes and programs organized by professional societies and organizations.

In FY2016 the project management team worked with CSUSB/COD project to ensure the successful completion of their no-cost extension activities by the end of the fiscal year. The project management team also provided in-depth support to the four new awardees. Examples include a new awardee virtual orientation, monthly Principal Investigator teleconferences, communication with campus budget personnel, feedback on evaluation plans, and Year 1 site visits to each project. Additionally, the project management team communicates regularly with the Points of Contact (POCs) at the partner NASA Centers to provide support and guidance for project activities.

## **ACTIVITY PARTNERS AND ROLE OF PARTNERS IN ACTIVITY EXECUTION**

The 6 awardees (including 4 new awardees in FY2016) are partners in MC3I. Other partners include NASA Centers and Universities that collaborate with these awardees to develop curriculum and provide research experiences for students and faculty, and industry partners who provide guidance and career exploration opportunities for students. The following is a list of partners for each of the new awardee campuses:

**Baltimore City Community College** - NASA Goddard Space Flight Center (GSFC), Morgan State University (MSU), Capitol Technology University (CTU), Coppin State University (CSU), University of Maryland Baltimore County (UMBC), Baltimore City Public School Systems (BCPSS), Juxtopia LLC, Lockheed Martin Corporation, the AMTEK Company, Baltimore Gas & Electric (BGE), Amazon/JLL, National Society of Black Engineers (NSBE), Career Communication Groups (CCG), United States Postal Services (USPS), and Maryland Center for Veterans Education and Training (MCVET).

**Queensborough Community College** – NASA Goddard Space Flight Center (GSFC), University of Colorado at Boulder Colorado Center for Astrodynamics Research (CCAR), the Catholic University of America (CUA), and the New York Space Grant Consortium.

**Napa Valley College** – NASA Armstrong Flight Research Center (AFRC), College of San Mateo (CSM), CSU Fresno, Irvine Valley College (IVC), Los Angeles City College (LACC), Reedley College (RC), and Sonoma State University.

**Santa Monica College** – NASA Jet Propulsion Laboratory (JPL), Arizona State University (ASU), University of California, Los Angeles (UCLA), and University of Southern California (USC).  
The “sun-setting” CSUSB/COD MC3I project secured additional funding in FY14 to expand and sustain MC3I activities with partner NASA Armstrong.