



California Space Grant Consortium– Proposal #35

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### **Promoting STEM Preparation at California Community Colleges Using Low-Cost Programmable Micro-Computers**

Many of California's best and brightest high school graduates cannot afford or are not prepared to enter either the University of California or the California State University System. Instead they begin their post-secondary school education in the California Community College System, which includes 112 community colleges and over 2.1 million enrolled students. This two-year college system provides workforce training, certificate and degree programs, and critical preparation to four-year universities. Many of these community colleges strive to develop better bridge programs for their students interested in pursuing a STEM (Science, Technology, Engineering, and Math) degree program at a four-year university. The current proposal to NASA is a two year pilot program that is designed to enhance the STEM preparation at 12 California Community Colleges and improve a bridge opportunity for 300 students to either the University of California or the California State University system. The proposal is in direct alignment with the Co-STEM Priority Areas 3 and 4: Enhance the STEM Experience of Undergraduate Students and Better Serve Groups Historically Underrepresented in STEM and is also in direct alignment with NASA Education Lines of Business: STEM Engagement and Educator Professional Development. This multi-faceted program includes (1) the development of a new UC-approved distance learning STEM course for community college faculty and students that includes education and training in programmable microcomputers and current NASA research activities, (2) the development of exciting student team STEM based projects, taught at each of the community colleges, using low-cost programmable microcomputers to enhance the students' STEM preparation leading to increased STEM retention and an improved bridge to four-year universities, (3) direct involvement of the community college faculty with one of three California NASA Centers through an annual one-day facility visit that includes tours and meetings with researchers and the Office of Education for the purpose of adding NASA content to existing campus programs and student projects, and (4) direct involvement of the community college students with one of three California NASA Centers through an annual one-day facility visit that includes tours, seminars and career counseling with researchers. Each community college is free

to select their own team project that involves the use of programmable microcomputers to collect, store, and transmit in-field sensor and GPS locator data, as well as drive a controller. Proposed example projects, include near-space ballooning, small satellites, UAV auto-pilots, autonomous ground robots, and wearable sensor vests for sports and health monitoring. Fellowships and awards will be focused towards historically underrepresented groups, active military and veterans, and students with physical and learning disabilities. Both students and faculty will have significant investments (over 160 hours of involvement) in this project through the training, hands-on team projects, and visits to the NASA Centers. This proposed program is designed to be easily sustainable, as well as expandable to additional community colleges, where continuation costs are minimal: (1) training for community college faculty using the distance learning course that will have already been developed, (2) student-led projects for improved STEM preparation, and (3) NASA-led interactions with the faculty and students.