THE CALIFORNIA UNIVERSITY
STEM COLLABORATIVES

STEM Teacher Preparation Student Success Initiatives at Sacramento State
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The Colleges of Education, Engineering & Computer Sciences, and Natural Sciences & Mathematics at California State University, Sacramento are leveraging multiple grant-funded projects to improve K-12 STEM teacher preparation and student success.

Revitalizing Undergraduate Science Education for Future Elementary Teachers

Project Goals:
- Modify at least one laboratory activity in each of three science classes taken by future elementary teachers to incorporate the theme of RIVER.
- Identify hands-on project-based activity to introduce with a common theme
- Identify lab safety practices from Foothill College Science Standards
- Align with Common Core State Standards-Mathematics
- Connect to the real world

Sacramento Math and Science Teaching Program (SacMAST) Noyce Scholarships

Project Goals:
- Recruit and support STEM majors or STEM career changers to become effective middle or high school math or science teachers.
- Sacramento State has had four NSF Noyce projects. Three Scholarships Programs have supported 40 new STEM teachers.

Community College Partnership:
- In collaboration with American River College, and with additional funding from Mission and Colleges, we host week-long summer bridge academies for Title I high school students, Noyce Scholars and community college students assigned to teaching the bridge activities.

Understanding Math and Science Through Sports: CSU-Chevron STEM ZONE Partnership

STEM ZONE:
- Hands-on interactive workshops-style environment
- Features learning stations for cryptography, escape and acceleration, Bernoulli’s Principle, reaction time, pendulum, back, thermal imaging, etc.

Project Goals:
- Increase teachers’ /future teachers’ skills and confidence in teaching STEM concepts and practices
- Improve teachers’ /future teachers’ STEM content knowledge
- Increase students’ knowledge and interest in STEM
- Create sustainable resources for teacher professional learning

Activities:
- Developed a teacher handbook
- Provide information on CSU and NGS practices
- Links to other sports and STEM examples

Faculty Learning Communities (FLCs)

What is a Faculty Learning Community (FLC)?
- A structured community of practice of 10-15 faculty with a curriculum, deliverables, and timeline to plot solutions to specific problems/theses in higher education
- A documented individual professional development practice (Milan Coz, www.ufl.edu/university)

Project Goals:
- The goal of the FLC is to develop skills, knowledge, and expertise in the area of interest by creating a focused time and space apart from the daily work environment. The products of FLC include faculty to collect and evaluate evidence of student learning or research for existing materials.
- Recent STEM-focused FLCs
  - Science Technology Engineering and Mathematics (STEM) Student Success
  - Pre-Calculus and Calculus Teaching and Learning
  - Undergraduate Research: Engaging Students in Curricular and Co-Curricular Settings
  - Grant Writing for the Next Generation Science Standards and the Common Core State Standards
  - Chemistry and Mathematics STEM Gateway Courses

Solar Decathlon

Project Goals:
The U.S. Department of Energy Solar Decathlon challenges collegiate teams to design, build, and operate solar-powered houses that are cost-effective, energy-efficient, and attractive. The winner of the competition is the team that best balances affordability, consumer appeal, and design excellence with optimal energy production and maximum efficiency.

Sacramento State is one of 20 international teams competing in the 2015 Decathlon.

As a component of the decathlon, Sacramento State’s NSF-funded Noyce Scholars (fellowship for preservice teachers) will design, build, and operate a solar educational curriculum aligned with California standards. The curriculum will be used to engage students in STEM content, assess student achievement in the buildings, and transition the residential housing market by directly influencing the education of future generations of home buyers.

Other Sac State students involved:
- Construction Management, Engineering, Communication Studies, Business, Interior Design

Aquaponics & Future Elementary Teachers

Aquaponics is a system of aquaculture in which the waste produced by farmed fish supplies nutrients for plants grown hydroponically, which in turn purify the fish. Horticulture: the process of raising plants to desiccate organic foot waste – supplies food for the fish.

Project Goals:
- Utilize Sacramento State’s aquaponics system in Environmental Studies to provide future elementary teachers (in the teaching credential elementary science methods course) with unique content related to real-world problems of food and water supply. Future elementary teachers design and plan integrating NGS and the study of aquaponics and then teach that unit to visiting elementary school students after they tour the aquaponics system.
- Unit Plan topics include:
  - agricultural sustainability; human impact on Earth's systems; energy transfer of matter in ecosystems; interrelationships of living and nonliving environments; nitrogen cycle; water conservation

Sacramento State’s aquaponics system is housed at STORC – the Sustainable Technology Orchard/Optimization Research Center

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