The Center for Sciences will be a focal point in the center of campus, located within a revitalized Centennial Park, and will serve as a crossroads accessed by pedestrian walkways leading from public transportation, campus dining, residential halls, and the University Union. The main volume of the Center for Sciences serves as an extension of these pedestrian walkways, with a corridor linking a variety of teaching laboratories and lab support spaces, emptying out onto stepped public terraces overlooking the surrounding park. At the core of the center, intersecting the volume of laboratories at its midpoint, is a volume housing an atrium, offices, and public interaction space, with strategically placed glazing opening up to campus views. The building’s green roof gardens will mitigate the building temperature, reduce stormwater runoff, and increase the roof’s lifespan. Rainwater will also be captured, filtered and used as part of a water-use reduction system that includes high-efficiency plumbing fixtures and waterless urinals. The surrounding Centennial Park will be made up of native plant species, minimizing irrigation needs and creating a natural habitat for local wildlife.

The brick exterior cladding of the main volume will be sourced from a local quarry and will act as a rain screen wall system, with a ventilation space behind the cladding and 3” of continuous insulation that will allow for the downsizing of HVAC equipment. The design team, led by ZGF Architects and Rumsey Engineers, worked with other consultants, campus facilities staff, and user groups to carefully integrate office and lab spaces with the highly energy-efficient building envelope, utilizing daylight and minimizing heating and cooling loads. HVAC equipment will also be downsized based on prior research and lab building design carried out by Rumsey and the implementation of many of the principles of the Labs 21 Energy Efficient Research Laboratories Guidelines developed by the Lawrence Berkeley National Lab (LBNL). The building ventilation system will be monitored by temperature and flow sensors and electricity use will be tracked with sub-metering equipment for lighting, plug loads, and HVAC equipment. An interactive touch screen located in the atrium will display the energy use data.

The building atrium utilizes a passive smoke management system which doubles as a passive cooling system.

The atrium ventilation system, which was designed with Arup Fire and CPP Wind, consists of air intake doors with openers controlled by the fire alarm system and ventilators installed atop the atrium. During an alarm event, the doors automatically open to provide intake air, and smoke in the atrium is exhausted through the ventilators. As a passive cooling system, the windows in the offices, public areas of the atrium, and the corridors provide intake air, which is then drawn to the top of the atrium and exhausted naturally during the stack effect. The system will provide significant cost savings in comparison to a traditional mechanical smoke.
management and cooling system. Laboratory cooling will be provided by the campus central cooling plant. The system will be fitted with active chilled beam diffusers, with zone switchover valves that separate heating and cooling supply air. This allows for ventilation air when no heating and cooling is necessary, resulting in a 20% reduction in required airflow and substantial energy savings. The labs are supplied with 100% outside air, supplemented with heat recovery from exhaust air to decrease heating energy. In lab spaces with a substantial number of fume hoods, no additional supply air is required as the large volume of supply air at 65°F is sufficient.

Another innovative feature of the building is the Aircuity monitoring system that will constantly track air quality to further increase energy savings and lab safety. The system allows for a low air change rate (ACH) rate of 4, increasing to 6 ACH on a zone-by-zone basis when specified thresholds of toxic chemical levels are detected. At night, during unoccupied hours, the ventilation system will decrease to 2 ACH. Variable-volume fume hoods and the Aircuity system combined will reduce energy by 30% below that of a conventional lab building.

In offices and classrooms, supply air is primarily distributed via displacement ventilation (DV) through user-adjustable wall diffusers, supplemented by operable windows for additional personal control and comfort. With displacement ventilation, air is supplied at a low level, is drawn to areas needed by the thermal “plumes” of occupants. The DV system will be enhanced by radiant ceiling panels to be installed in suspended ceilings, which will be utilized only when rooms require additional heating and cooling.

LESSONS LEARNED
Cal Poly carried out a series of sustainability charrettes that began at the beginning of the design process, involving the architect, landscape architect, engineers, and facilities manager—as well as students, professors, contractors, and buildings estimators. Barbara Queen, project manager at Cal Poly, explains that by having all consultants and stakeholders involved from the beginning, working to define design objectives and potential building elements, simple sustainable strategies were developed holistically. Todd Rinehart, Senior Project Architect at ZGF Architects, states that sustainable strategies such as the masonry rain screen and the atrium ventilation system achieve multiple benefits. The masonry rain screen and building façade will allow the air handling system to be downsized while working with interior layouts, and the atrium’s smoke management system doubles as passive cooling. Joe Wenisch, mechanical engineer at Rumsey Engineers, notes that the center is a model for sustainability going hand-in-hand with cost savings. The chilled beam for the labs, for example, will be cheaper on a first-cost basis than radiant cooling or a traditional VAV reheat system.