Students taking MTE 491/591 Materials and Technologies for Advanced Energy Systems/Applications create clean-energy devices using inexpensive and recycled items.

By Miranda Barrett | Photos by Shannon Auvil

College is intended to prepare young adults for the real world, but in Nitin Chopra’s Advanced Energy class, students are already affecting the real world from inside the classroom.

After participating in the UA Center for Ethics and Social Responsibility’s Faculty Fellows in Service Learning Program, Chopra, associate professor of engineering, launched a course in Spring 2014 in which UA students develop novel and low-cost alternative energy systems for use in everyday situations.

Students use discarded and inexpensive materials to generate clean electricity and thermal energy that could reduce pollution and be especially helpful in low-income homes and economically struggling communities.

“The environment matters,” says Andy Kim, who worked side the classroom.

It is known that alternative-energy routes are not cheap in the world, but in Nitin Chopra’s Advanced Energy class, it is intended for a broad range of engineering and science students and brings together concepts in materials science, chemistry, physics and other engineering fields to help students fundamentally understand current energy systems, demands and technologies as well as those on the horizon.

“Approaches toward energy generation and conservation provide many opportunities for young researchers who have creative ideas and are not set in the old status quo. It is truly the work of young entrepreneurs.”

“The focus of Schwarm’s graduate research is non-fossil-fuel energy sources. “More than anything, taking this class showed me that the technology and the resources necessary to replace fossil fuels with cleaner, more reliable sources already exist,” Schwarm says. “My view of how technology works in the world has changed; I now realize that everyone plays a part, not just researchers and entrepreneurs.”

Rusty Sutterlin, a company founder and its chief science officer.

Chopra is developing partnerships to help transfer students’ ideas into widespread use. In Spring 2015, the class is collaborating with Inventure Renewables to develop cheap thermal energy that could be used in homes and other buildings.

Inventure Renewables uses biomass waste and low-cost materials to produce alternative energy and was founded in 2007 through a UA business-incubation program. The company graduated from the program in 2013 and moved to a 30,000-square-foot facility in downtown Tuscaloosa.

“This is quite exciting for me as an instructor because this gives my students an opportunity to see how their semester-long effort can be incorporated into real-life technology,” Chopra says. “Students will also be exposed to industrial standards and criteria in the context of alternative-energy devices and platforms.”

The partnership offers advantages for Inventure as well, says Rusty Sutterlin, a company founder and its chief science officer.

“By utilizing UA students, we can conduct preliminary test projects to determine if we should prioritize research ideas into full projects,” he says. Both the course and Inventure Renewables are inspiring students to pursue alternative-energy solutions long term.

UA graduates make up more than 80 percent of Inventure Renewables’ workforce. “Today’s generation understands the importance of energy and that the future of energy is dependent upon new and innovative ideas to generate and store it,” Sutterlin says. “Approaches toward energy generation and conservation provide many opportunities for young researchers who have creative ideas and are not set in the old status quo. It is truly the work of young entrepreneurs.”

FROM LEFT: UA students Sam Schwarm, Allen Deen, Andy Kim and Kiddeep Kumar display a solar panel they built using $2 solar landscaping lights.

Using a TV panel, students apply solar energy to heat a copper plate. They expose the other side of the plate to freezing temperatures, and the gradient between the two sides creates electricity.

Students use copper wire to connect solar panels from disassembled garden lights. They then attach the panels to a water-splitting system, which produces voltage that can charge batteries and provide real-time power.

A lens from a rear-projection TV focuses sunlight at temperatures of 392 °F and converts it into enough energy to rotate a computer fan and light an LED bulb.

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