Graduate student Jason Smith remembers chuckling as he read a proposal from Professor Thomas Filburn in the fall of 2011. “I was thinking to myself, ‘They want to do what?’ Then I read further and found it a bit startling that he thought we could do this.”

“This” is a subscale See-Thru Nuclear Power Plant, which was indeed designed and built over the ensuing 16 months by roughly a dozen undergraduate and graduate students in the University’s College of Engineering, Technology, and Architecture (CETA), with direction from mechanical engineering professor Filburn. During the University’s brief winter-break term in January 2012, a handful of area community college students also helped out.

As CETA’s newest teaching tool, the miniature nuclear plant provides students with a hands-on feel for the routine and off-normal operation of a pressurized water reactor nuclear power plant. The students who worked on the project say it was unlike anything they have ever done in the classroom. “This was real-world engineering,” said senior Ryan Powers. “On this project, if you got something wrong, you didn’t get a red X on a piece of paper. Here, if it didn’t work, you had to keep working at it until you fixed it.”

“There was a lot of troubleshooting involved in this project,” added Smith, who served as the project manager. “In the classroom there’s not a great way to teach troubleshooting. Here, it was all about troubleshooting and finding solutions to the problems.”

The students started with plans from a similar model built at the Millstone Nuclear Power Plant in Waterford, Conn., but those limited technical documents were quickly modified and adapted. Filburn says the unusual, highly educational aspect of the completed power plant is that it is made of glass tubing, so students can see how the plant generates steam and converts that steam into power to turn a turbine, just as an actual pressurized water reactor power plant does. The model also features computer display screens that are replicas of the control panels in working nuclear power plants.

The subscale See-Thru Nuclear Power Plant was made possible through a $121,000 grant from the Nuclear Regulatory Commission (NRC), a $10,000 grant from Dominion Energy (owner of the Millstone Nuclear Power Plant), and $5,000 from Westinghouse Electric Company. The University is now seeking a grant to purchase the supplies to build a turbine that can be connected to the steam-generating model.

When the plant was unveiled in February 2013 for representatives of the U.S. Department of Energy, the NRC, and nuclear power industry representatives, Peter Lyons, who is the U.S. Department of Energy assistant secretary for nuclear energy, said there will be a growing demand for engineers to work in nuclear power plants in the years ahead, and this training tool will give CETA students a tremendous advantage. Filburn says, “We tell high school students and their parents that if the student comes to the University of Hartford and is a top performer, he or she will have opportunities to work on projects that only graduate students do at UConn or Michigan.”

The value of this undergraduate experience isn’t lost on Powers, who says he will highlight the experience to potential employers. “None of us had all of the skills that a project like this requires when we started, so we worked hard and gained a lot of those skills during this process.”
Eating insects, playing with robots, and designing video games are activities not normally seen on a college syllabus. But University of Hartford students tackle these assignments in Guerrilla Food, Fundamentals of Computing, and Video Game Theory and Analysis in order to learn about real-life situations.

This year, Katharine Owens, an assistant professor of politics and government, required students in her first-year seminar, Guerrilla Food, to complete a bug-eating project. Students prepared more than 600 chocolate-covered crickets on sticks, with side cups of mealworms among the Chex Mix, and served them to classmates in Gengras Student Union. It was all part of learning about the impact a high-protein diet has on the environment.

“One of the things we are exploring is food and sustainability,” says Owens. “The high amount of protein Americans eat isn’t environmentally sustainable. Some people believe that pursuing insects as food, called entomophagy, could help sustain our desire for protein.”

While many students did not want to try the insects, those who did seemed pleasantly surprised, describing them as “crunchy chocolate.” Others claimed they could not even tell they were eating bugs.

Robots, not bugs, help convey the fundamentals of computing, in the introductory course of the same name for computer science majors. Assistant Professor Brian Dorn, who studies human-computer interaction, gave each student a small robot to work with over the course of the semester.

“Students who are learning computer science today come from a very different technological world than when I went to college,” Dorn explains. “They are looking for ways to make computing more personal. Robots are novel, so they have a lot of curiosity about them.”

The robots are not preprogrammed; students must write the code for all of the machines’ functions. Their first assignment was to make a video of a dancing robot, programming the choreography and synchronizing the dance moves with music. The robots’ digital cameras and sensors are used to film the videos. Dorn admits the robots are fun but says they are also very useful tools to help teach code, computations, and other elements of computer science.

“Hands-on learning makes computer science more realistic,” says Dorn. “In the real world, we don’t just solve little problems. We work with hardware, we interact with sensor data. In class we solve all sorts of interesting problems—using the same sort of computer science knowledge we would normally teach in intro courses—but [we solve] them with a robot.”

Lauren Cook, an assistant professor of cinema, also uses technology to help her students relate to actual situations in Video Game Theory and Analysis, an honors-level class that examines the cultural, political, and economic impact of gaming. There is much more to this class than simply playing the latest game.

For a final project, Cook’s 13 students either wrote a paper or designed a video game that focused on the interactive aspect of gaming, known as emergent game play. Connor Howard ’15, a communication major, created a spin-off of the popular Pokémon game. Max Irvine ’14, a music production technology major, designed his game based on the action-adventure game Dante’s Inferno, which forces players to build their own paths to the game’s different levels.

Cook says it is the interactive elements that makes the study of video games so valuable. She points out that video games, such as Tetris, have been used to treat post-traumatic stress disorder in soldiers. EteRNA, an RNA sequencing game, allows crowd sourcing. Cook says the game’s designers want the players to collaborate and make discoveries about major diseases that would be too complicated for computer models to uncover.

The hope is that these discoveries could lead to potential cures.

“There are a lot of really incredible interactive, experimental games that deal with political situations and human-rights situations,” says Cook. “As we’re seeing, video games are actually solving major, real-world problems.”