In the fall of 1983, in response to SCHEV’s goal of expanding technical education opportunities for Virginians, the University of Virginia (UVa) began broadcasting courses in Materials Science and Civil Engineering to students at a receiving site in Virginia Commonwealth University’s Cabell Library. By 1984, both UVa and Virginia Tech were broadcasting via instructional television fixed service (ITFS) transmitters to receiving sites in their regions.

Nearly 30 years later, what started out as a distance-learning experiment with a handful of classes taught by instructors at the Commonwealth’s two renowned engineering schools has evolved into a dynamic partnership of five institutions offering master’s degrees, certificate programs, and non-credit seminars to practicing engineers and scientists. Now known as the Commonwealth Graduate Engineering Program (CGEP), this collaboration among UVa, Virginia Tech, George Mason University (GMU), Old Dominion University (ODU), and Virginia Commonwealth University (VCU) has become Virginia’s premiere provider of accessible post-baccalaureate engineering education.

Thousands of students have enrolled in CGEP courses over the years, with 499 going on to earn a master’s degree at UVa alone. According to Dr. James Groves, UVa’s CGEP program director and Assistant Dean for Research and Outreach in the School of Engineering and Applied Science, typical graduate enrollment in UVa CGEP classes varies from 10 to 30 students on campus, with about an equal number of off-grounds students. Dr. Groves believes that there are opportunities to grow off-grounds enrollments, but the current use of videoconference technology as a primary medium for course transmissions in recent years has been limiting.

“Our targeted audience of working engineers can find it difficult to get to one of our videoconference receive sites,” says Dr. Groves, “especially in the Northern Virginia area. With traffic congestion and gridlock, students might not be able to make it to a 6:00 pm class even if they leave the office at 5:00.” Dr. Groves, who served as CGEP State Chair from 2004 to 2008 — the chairmanship rotates among the five participating CGEP institutions — hopes that recent technological upgrades will allow CGEP instructors to reach even more interested students.

**Sparking a Discussion of What’s Next**

Advances in IT hardware and software have afforded periodic opportunities for the participating institutions to make changes to the CGEP technology platforms in order to offer the best teaching and learning environment at a reasonable cost. One of the more recent technological developments is the ability to transmit course broadcasts over the commodity internet, as opposed to a special network.

When the Virginia legislature offered financial support for the University of Mary Washington to build an educational facility outside the gates of the Naval Surface Warfare Center at Dahlgren, CGEP institutions came to an agreement to refresh the program’s technology platform. “CGEP courses used to be taught on base,” says Dr. Groves, “so University of Mary Washington officials asked for our input on the newest technologies to facilitate an interactive distance learning environment. That sparked a discussion amongst CGEP institutions about what’s next and newest for this type of learning environment. We agreed that the commodity internet offered many advantages for students and faculty alike.”

Previously many CGEP courses were taught via video teleconferencing (VTC) technology, which required both the students and the instructor to be physically present at a technology-equipped site. Students’ time with their professor and other classmates was limited to scheduled class sessions, and course availability was limited based on the capacity of the VTC facilities.

But discussions sparked by the creation of that new educational facility from the ground up led CGEP members to conclude that the internet’s growth and pervasiveness provided the capacity for a stronger, more interactive learning environment. While technological differences will still exist from class to class, all CGEP institutions are planning to complete a transition to online instruction by Fall 2012.
In the near future much of CGEP’s course delivery will be in real-time, although some of the universities are even exploring how to use the internet environment for asynchronous course delivery.

**No Longer Confined to the Traditional Classroom**

The online instruction model will allow both the instructor and students to participate in real-time via the web from almost any computing platform with a reliable internet connection. This means CGEP students, most of whom are members of the engineering workforce, can attend class from their office, their home, or even while working out of town or on vacation. Professors can lead class sessions from project sites or conferences, and they also have greater flexibility to invite guest speakers to lecture.

Professor Groves says all web-based classes will be video equipped and have two-way audio capabilities. If students want to share a comment or question during class, they can press a button and a raised hand icon appears next to their name on the live list of participants. Professors can also manage their settings to hear an audio cue when students raise their hands. Visually, students can see what Dr. Groves calls “electronic inking;” instead of a grainy video of a white board, students see a live data stream of images written on Smart tablets or shared via PowerPoint slides, for example. In addition to connecting students for instructional classes, the new internet-based model makes networking outside of class much more feasible. For example, distance learning students can connect with their instructor during office hours, whereas the video conferencing model only allowed students to interact visually with their professor when the network was up because class was in session.

The web also allows student-to-student interaction outside of class. “Instead of being confined to a specific instructional period, students can log in anytime and see which of their peers are online,” explains Dr. Groves. “They can instant message other users or share video and screen images at any time of the day or night, whenever they happen to be studying.”

This past fall, UVa offered 20 engineering classes to students at a distance, 15 of which were offered using the new web-based environment. The University expects that 100 percent of its engineering distance learning classes will be online by January 2012.

Dr. Groves hopes that CGEP will experience an increase in off-campus enrollment now that the new technology allows for more flexibility and mobility, but he says that making sure that current students are comfortably on board is a priority. End-of-course questionnaires completed by students already using the new online model are promising.

“This is one of the biggest changes CGEP has undertaken,” says Dr. Groves, “and I am proud of the group’s collaboration. For a quarter century, we’ve been working together and engaging each other on a regular basis about how to grow Virginia’s engineering capabilities and better serve the needs of students.” In that time, he says, CGEP has evolved from “two schools broadcasting via VTC to a partnership of equals.”

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With the transition to internet delivery, CGEP students are now able to participate in graduate engineering classes wherever they can access the internet.

In the near future much of CGEP’s course delivery will be in real-time, although some of the universities are even exploring how to use the internet environment for asynchronous course delivery.

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