1983 Anniversary Edition 2008

Distance Learning News

Commonwealth Graduate Engineering Program Celebrates 25th Anniversary This Year!

IMPORTANT EVENTS - 1983

U.S. Statistics

President: Ronald W. Reagan
Vice President: George H. W. Bush
Population: 233,791,994
Average cost of new house-$82,600
Average income per year-$21,070
Cost of a first-class stamp -$0.20

U.S./World Events

Second space shuttle, Challenger, makes successful maiden voyage, which includes the first US space walk in nine years

Microsoft Word is first released

McDonald's introduces the McNugget

The DeLorean Motor Company ceases production

U.S. invades Grenada

The FCC authorizes Motorola to begin testing cellular phone service in Chicago

Commonwealth Graduate Engineering Program began first televised transmission of engineering classes via microwave link from UVA in Charlottesville and VaTech in Blacksburg to classrooms in Cabell Library at VCU in Richmond.

The First CGEP Directors

George Mason University
John Wenzelberger
(retired from GMU; deceased)

Old Dominion University
William J. McMahon
(Associate Vice President for Academic Affairs, ODU)

University of Virginia
George L. Cahen
(Director of Experiential Programs and Engineering Outreach, UVA)

Virginia Commonwealth University
Thomas W. Haas
(Professor of Chemical Engrg, VCU

Virginia Tech
Benjamin S. Blanchard
(Professor of Engineering-Emeritus, Virginia Tech)

The Present CGEP Directors

George Mason University
Sharon Caraballo

Old Dominion University
Linda Vahala

University of Virginia
James F. Groves

Virginia Commonwealth University
Rosalyn Hobson

Virginia Tech
Glenda R. Scales

Congratulations from Professor George L. Cahen, Jr., past Director CGEP, UVa

Congratulations to the Commonwealth Graduate Engineering Program and to all those that have nurtured this program for the past 25 years!

Five years ago I wrote: "I still see the opportunities as great today as when this program began 20 years ago for both the universities and the off-campus students and corporations. We need to guard against viewing this activity as a mature entity that just needs monitoring. We need to continuously push for new and increased involvement by our corporate clients. We also need to be careful in how we judge the cost efficiency of a program like this…since it is difficult to know what to compare it to and perhaps more importantly, it is difficult to actually know what it will grow to become."

Today, I see this program as a foundational program evolving more completely into the education mission of the Virginia Engineering Schools. Today I see a program that will serve Virginians in high school and regional undergraduates programs like the upcoming cooperation with the Lynchburg area industry and community college.

I am very proud to have been associated with this program. Those of you who continue to serve the CGEP should be very proud also and take pride in knowing that you are doing important work for the Universities, the Commonwealth of Virginia, and Virginia's students.

Congratulations from Professor Ben Blanchard, past CGEP Director, Virginia Tech

"While I often think of the challenges and excitement of being initially involved (both in an administrative capacity and the teaching on TV) in the CGEP from its inception and throughout the 1980s/1990s, the real fulfillment and reward (from my perspective) relates to the subsequent sustainment and associated success that the CGEP has experienced through the years. Let me extend my congratulations to you all, on this 25th anniversary, for all that you are doing (and have accomplished) in reaching this significant milestone. The real proof of what we did back in the old days is what you see today in this excellent and growing State-wide program. Again, congratulations and many thanks for your continuing efforts."

Ben Blanchard, Professor of Engineering Emeritus, Virginia Tech.

Comments from the CGEP State-Wide Director

James F. Groves,
University of Virginia

As I reflect upon the 25th anniversary of the establishment of the Commonwealth Graduate Engineering Program, I would like to look forward to the next 25 years, rather than to dwell upon the past. The concept of bringing five engineering schools together to make graduate engineering courses and masters degrees available in a distance environment is perhaps unique in the United States. As a result of the cooperation, students who participate in the program have access to a broad array of degrees and course offerings, more than any one school could offer alone. Still, during my six years of involvement with CGEP, I have concluded that the program has the potential to make an even bigger positive impact upon the Commonwealth of Virginia. It can be so much more, and there appear to be at least three important impediments that restrain the program from increasing its already important impact at least two-fold.

The first reason is technology. Those involved with CGEP from its early years can certainly attest to the dramatic steps forward taken by the program in terms of the technology used to make courses available. Having started with microwave transmissions of one-way video and two-way audio, the program now uses the very latest in interactive video conference (IVC) technology with two-way audio and video to reach students. The improvements in terms of transmission quality and costs are truly amazing. Yet, even as advanced as it is, the latest interactive video conference technology is limiting CGEP's ability to reach its full potential. The technology requires students to come to specific receive sites to participate in class. Increasingly CGEP students want to access their course content from anywhere, and often at any time. Many of CGEP's working engineer students travel extensively and are simply unable to return to their local CGEP receive site once or twice each week throughout the semester. Furthermore, the IVC technology requires rooms at both broadcast and receive locations that are equipped to transmit and receive the course broadcasts. In the case of the nanotechnology course sharing program recently undertaken by CGEP, this has caused several bottlenecks. Working engineers want to weave their work and education together as smoothly as possible, and, with IVC, that means that classes need to be scheduled after normal 8 a.m. to 5 p.m. work hours. However, CGEP's core course sharing program (outside nanotechnology) already uses all available IVC classrooms at the broadcast universities and the receive sites during that timeframe. Thus, the CGEP schools have made their nanotechnology courses available during the mid-day when classrooms are available. However, delivery of the courses at this time has made them widely inaccessible to working engineers. This disconnect is reflected in the lower than hoped for enrollment of working engineers in the program. In sum, CGEP's technology platform, as advanced as it is, has not allowed it to connect its latest emerging technology course offerings with its students. This has been an important but difficult lesson of the nanotechnology initiative. It underscores CGEP's ongoing need to adapt to changing technology and work flows. A more in-depth discussion of the successes and challenges of CGEP's nanotechnology initiative can be found in a paper that I have recently had accepted for this fall's Frontiers in Education conference sponsored by the American Society for Engineering Education (ASEE) and the Institute of Electrical and Electronic Engineers (IEEE).

Increasingly, the ability to deliver courses to the computer desktop and related mobile information technology devices will be important to CGEP. At its recent spring advisory board meeting, CGEP discussed this challenge with its board. The board understood the challenge and recommended that the program begin by identifying a pilot program that would allow CGEP to begin definition of on-line course platforms. Specifically, the board challenged the CGEP Directors to articulate what resources would be necessary at each institution for the development of a robust on-line course delivery solution for CGEP. As discussed at that meeting, there are many different "flavors" of on-line learning. There are many different hardware and software tools available. There are many different thoughts about how to deliver effective learning on-line in synchronous, blended (synchronous + asynchronous), and fully asynchronous manners. Each different delivery mode and technology solution represents opportunity for CGEP. As it has done over its first twenty five years, the program needs to continue to forge ahead with technology evolution if it is to have the truly significant, sustained impact envisioned by its founders.

The second reason is cooperation. CGEP is truly a testament to what institutions can accomplish when they cooperate. Over the years of CGEP, the five cooperating universities have implemented broadly similar methods of delivering graduate engineering course content to working engineers. They have come together to develop a common program web site and other marketing materials that inform working engineers of the opportunity. They have worked together to create similar policies and procedures to manage the program. As a result, students are able to tap into a significant set of academic offerings. Still, I am often left wondering if further cooperation could deliver yet another level of value to additional students. For many years I have felt that one of CGEP's other, lesser known, activities is significantly underutilized - the sharing of courses between the CGEP universities. The CGEP universities have a history of making their courses available not only to working engineers but also to graduate students studying towards research graduate degrees at the universities. By sharing courses in this manner, the universities have the opportunity to provide to students a broader portfolio of classes and access to more engineering experts and to themselves economies of scale. For years, James Davenport of Virginia Commonwealth University has taught a graduate statistics class through CGEP. That course has been taken by many, many working engineers and resident graduate students at other CGEP universities. Indeed, with the retirement of Professor Davenport this spring, everyone in the CGEP system has had to imagine what students will do this fall, when that statistics class is no longer available. Will each university teach is own section, or will students simply not have access to statistics in the fall? This spring, Harry Dorn of Virginia Tech and Mool Gupta of the University of Virginia teamed up to teach a course on nanoscale carbon, with half of the enrolled students being resident graduate students. The course was a wonderful example of how cooperation can provide students with an educational opportunity beyond the norm. Unfortunately, the incentives for teaching statistics to students statewide or for teaming with other faculty to create a unique course are limited. In each instance the faculty members involved are taking on extra work, and the recognition and reward given to them for that extra work is minimal. The faculty who have undertaken these activities do so because they value the opportunity to teach more students. The CGEP universities would be well-served if they all actively created mechanisms that rewarded additional cooperation among the schools. Distance learning technology and educational pedagogy are sufficiently advanced to allow effective, high quality instruction to resident graduate students. The CGEP universities would be well-served to take more advantage of course sharing in the years ahead.

The third reason is CGEP's funding model. From the outset, the General Assembly of Virginia has provided invaluable base-budget funding for CGEP. That funding allows the program to confidently plan its operations year by year. Undoubtedly it would be useful to CGEP if General Assembly support were indexed with inflation. However, it is not, and so, in real terms, CGEP has fewer and fewer General Fund dollars each year to support its operation. Still, I don't see the General Assembly's support as the real challenge for the program. Instead, the greater challenge is the internal funding model that appears to pervade the five engineering schools across the state. Except for one or two exceptions, e.g. the Computer Science program at Virginia Commonwealth University, there appears to be little connection between the number of tuition paying students in CGEP and the number of dollars available to run the program within each school. Here at the University of Virginia, I could work hard this year to market the program and double UVA working engineer enrollments. That would increase my expenses, as I must provide additional teaching assistant support to faculty. However, either this year or next year, I would see no increase in the number of dollars allocated to run the program - as the result of that increase in student enrollment. All of those extra tuition dollars would flow elsewhere in the university, with none returned to support enhanced CGEP operations. Thus, the current funding model actually acts as a strong disincentive to program dissemination. In order to ensure that my expenses continue to be manageable, I really want to make certain that my student enrollments do not grow too much. That seems truly sad. As we look towards the next twenty five years of CGEP, I would like to challenge the universities to develop a more flexible internal funding model that rewards those who increase the penetration of CGEP into engineering firms in Virginia and beyond. If the universities (and the Commonwealth) want to enhance their reputation for engineering excellence, what better way to do so that to connect with more working engineers.

CGEP can be a vehicle by which the Commonwealth becomes recognized as an engineering leader. Indeed that was part of the original vision of its founders twenty five years ago. If the program can attack the three challenges outlined above, it will enjoy a healthy next twenty-five years.

Fast Facts

134 different UVA instructors have taught distance learning classes

161 different UVA courses have been offered

403 total UVA courses have been taught in the 25-year period

In 1983 …

With the introduction of the noise-free compact discs, the vinyl record begins a steep decline.

More than 125 million viewers tune in to the last episode of M*A*S*H

NCAA Basketball Championship – N.C.State d. Houston (54-52)

NCAA Football Champions Miami-FL (11-1-0)

Congratulations to CGEP on its 25th anniversary!

CGEP has been a leader in the use of technology for graduate engineering education. For much of its first twenty five years, the technology of teaching in CGEP was distinctly different than that used in the standard university classroom. The differences challenged faculty and students alike - myself included! However, today, as information technology reaches a new level of maturity, it is critically important that the CGEP universities harness the advances of the IT industry into all classrooms for effective teaching and learning. The technology of CGEP is no longer pulling university faculty and students in a different direction than the educational mainstream. Now, the technology of CGEP is rapidly becoming the educational mainstream.

Best wishes for the next 25 years!

James H. Aylor
Dean, School of Engineering & Applied Science
University of Virginia

CGEP Technology Changes through the Eyes of One UVA Engineer

by Bob Hutchison, Chief Engineer School of Continuing and Professional Studies, University of Virginia

When I came to the university in October 1992 I was hired as a video/ satellite technician who would join two others in operating the UVA C-Band uplink, transmitting the CGEP program across North America. Our Scientific Atlanta 10 meter uplink facility had been installed in 1987 to take over the transmission of UVA CGEP courses from the terrestrial microwave in 1988. Steve Olsen, my boss, had been the Field Engineer for Scientific Atlanta responsible for building the uplink, and was hired by the university to run the uplink facility. Greg Weisiger, chief video engineer for the Division of Continuing Education, Steve and myself rotated weeks as operator for the uplink. We transmitted full broadcast video and audio to satellites tasked to deliver video and audio content to all of North America and Hawaii. Our students would go to one of our regional centers or, in some cases, their places of employment to participate in live classes via the satellite. Class content beamed to the satellite 25,000 miles above the equator and then sent back 25,000 miles to earth would reach them in their locations with about 1/3 of a second delay. They were able to interact with the instructor live via audio through a bridged telephone conference call. Between 1988 and 1994, satellite transponder space was cheap and the quality of our transmissions very high. We, along with other CGEP institutions, had a successful delivery rate of CGEP classes to our receive sites of almost 100%. Recordings of all classes were made on VHS videotape for review by students and faculty.

In 1994 several factors sent the cost of C-Band transponder rates into an upward spiral. The Commonwealth's Department of Technology negotiated a 3 year contract for Ku-Band satellite space and equipment to replace the C-Band systems. This meant three Ku transmission sites and dishes were installed in Virginia: UVA, ODU and VT. Also, every receive site needed a new dish and equipment. The signals from all uplinks were compressed and transmitted to the same transponder, theoretically incurring a cost savings for the Commonwealth by avoiding multiple transponder charges. Because the video and audio was compressed, there was a slight decrease in overall quality of our transmissions and also a slight fall off of successful delivery of classes to around 98%. With satellite, the points of failure were small in number: the transmission site, the satellite or the receive site.

In 1994 several of the CGEP schools began to experiment with and deliver limited classes to sites via two way H320 videoconferencing over ISDN telephone lines. Videoconferencing gave us the ability to not only hear our students off-grounds, but see them also. Video quality was diminished because of the limits of connections at 384kbps. By 1996 VaTech was experimenting with and delivering some of their CGEP classes via two way H321 videoconferencing across the newly developing network.Virginia ATM network. VaTech, along with Sprint and Bell Atlantic, created network.Virginia to enable the delivery of higher speed video/audio connections across the Commonwealth.

By Fall 1998, UVA and VaTech where delivering all their CGEP courses via network.Virginia to VTel videoconferencing systems equipped with ATM Network Interfaces. From our campuses our Multi Site bridging units connected to the VTel units at 1052 kbps, much improving the quality of the video and audio over the slower ISDN connections. Also, our bridges could make H320 ISDN connections to our business sites using telephone networks. Our failure rates went up that year because we were working on the bleeding edge of technology, with many detractors of any success. But the hard work of network.Virginia engineers, VT engineers and technicians, First Virtual Corporation engineers (they developed and built the Network Interface cards needed by the bridges and VTel systems), and our own ITC network engineers, along with us, made it possible to move to digital videoconferencing as our delivery system. Network.Virginia has been a great success, not only providing connectivity for videoconferencing, but making cost effective internet connections available for all institutions of education inside the Commonwealth. After several semesters of working out the bugs, our class delivery success rate has climbed back to better than 98%. Even though the points of possible failure have grown substantially from satellite days, the soundness of the equipment and network has proven to nullify those potentials.

In the 2001 we began to not only videotape all our classes for review by students, but also began to encode them using Windows Media giving students the opportunity to review or make up missed classes across the IP network using Windows Media Player. After experimenting for several years with H323 videoconferencing over IP networks, UVA installed and implemented H323 systems in all of our regional centers in time to begin IP delivery of classes in Fall 2005. The UVA sites have been equipped with Aethra videoconferencing systems, and the classes are distributed through a Codian MCU and Codian IP to ISDN Gateway for business sites still using H320 ISDN.

Fall 2006 brought us to improving the quality of content channel video (Powerpoint and other computer based graphics) by sending out a second stream of video using the H239 protocol. Sites would see on a second screen a higher resolution image of the content than was able to be sent over the H323 video stream. Also we began using Codian IPVCRs (capturing the video digitally) as the means by which we recorded classes for review, because they capture both the H323 stream and the H239 stream.

By Fall 2007 all of our receive sites were equipped with H239 compliant videoconferencing systems, and so all graphic content, computer generated and even overhead Elmo document camera content, was being delivered in the H239 stream completely separate from the primary H323 video stream. Therefore the students began seeing two separate video sources--the instructor on one and his/her content on the other. Beginning in Fall 2008 our Codian MCU will make connections with all of our H323 sites at a much higher bandwidth than we have been using, jumping from 768 kbps to at least 1920 kbps, and at some sites as high 4 megs. Higher bandwidth should mean higher quality video.

We do not know exactly where the technology will take us in the future, but we are experimenting with HD H323 at 720p and there is talk of systems eventually reaching 1080p. Many possibilities exist and are on the horizon for more non-synchronous delivery than could be paired with our asynchronous delivery or in some cases even replace it.

Twenty-five years have brought much change in technology, and I am sure the next 5, 10, 20 years will prove to do no less.

I have not tried to cite very many names in this article because of a real fear that I will miss several. It has been my pleasure to work with technical staff from all the CGEP institutions, and I have always felt that their skill, knowledge and hard work greatly over shadowed my own.

Remember this?

Learning Technologies: Then and Now

By Mark Harden and Nancy Gibson, Virginia Tech Video/Broadcasting Services

In the Fall of 1983 the Commonwealth Graduate Engineering Program (CGEP) began offering classes within the state of Virginia. The distribution of classes was done via microwave to receive only sites. Due to the fact that the video and audio via the microwave were a one way transmission, it was necessary to have a way for all remote sites to communicate with each other and the professor. This was accomplished by the use of a phone bridge (operated by the Department of Information Technology in Richmond) linking all of the sites together.

As the CGEP program grew, the microwave system could not meet the demand for additional remote sites. At this time, it was decided to change to a satellite based transmission. In the Fall of 1986, classes were transmitted via analog C-band satellite (with one way audio and video) to receive only sites in conjunction with a phone bridge. This allowed for more remote sites with minimal technical support from Video/Broadcast Services (VBS). Nine years later during the Summer of 1995, CGEP moved to digital satellite delivery with the same constraints. The use of the phone bridge was still necessary.

As technology changed, so did the discussion pertaining to quality of service and how to best facilitate learning. It was decided to change to an interactive video system that would allow two way audio and video transmission in real time without the need of a phone bridge. NetWorkVA was established and the transition to interactive video conferencing was ready for Fall 1998 classes. A video network operations center and help desk were established at Virginia Tech and 36 sites across the state were refitted and ready for the start of the semester. The following year saw additional ISDN capacity installed so that VT could provide bridging services to Virginia Consortium of Engineering and Sciences and off network business and government sites without having to purchase bridging services from an outside vendor. The number of engineering classes taught using this system increased from eight to 23 by the Fall 2002. As of the end of Spring 2008 semester, 51 engineering classes were taught using this technology along with courses from other departments.

Since the inception of NetWorkVA, there has been another upgrade to interactive video conferencing technology. During the Summer of 2006, the technology moved to an IP based system which allowed for dual transmission of both full motion video and digital graphics via the computer/laptop or a digital document camera while still supporting two way audio and video in real time. This enhancement has made it possible for students to view

the professor and the high resolution graphics simultaneously while still allowing for immediate interaction. It is also possible for the professor to view several remote classrooms at once further enhancing feedback.

The new system also allowed us to offer the additional service of streaming classes and posting them to the web. Video on demand service began in Fall 2001 and continues to grow in the number of classes streamed each semester as students and professors realize the advantages of being able to view a missed lecture, help as a study aid for tests, or personal evaluation of content. This also allowed for pre-recording a lecture for on-demand viewing before the next scheduled class. The streaming server was updated in 2004 to a hard drive array which supports approximately 4 terabytes of storage. This server is slated to expand to over 10 terabytes during Summer 2008. Files are currently offered in RealMedia and QuickTime formats with Flash to be offered for Fall 2008 semester. Not only does the streaming video enhance the classroom experience, but it is now also possible to offer this resource to Virginia Tech for special events. It is the goal of VBS to develop real-time archiving of files to better support the needs of the university community.
The technology that is brought into the classroom to both teach and learn has also changed over the years. Originally, graphics and overheads were on paper or transparencies and transmitted via ceiling mounted camera rather than use a standard blackboard. The professor would then write or otherwise mark up the salient points of the lecture during the discussion. With the increasing use of computers, the need to have one to more effectively teach was realized and accommodated. Virginia Tech origination rooms were equipped with PC's. Laptops became more prevalent and personal laptops have been integrated into the system. Students now bring in their own laptop or tablet PC to class and have the option to participate in the lecture using a server system called DyKnow Vision (http://www.dyknow.com/vision/) which allows interactivity on the graphic itself.

As the technology has developed, CGEP has adapted to new paradigms and challenged the technology to do more. These changes have led to more effective distribution of knowledge while keeping the student as the main focus. In many cases, the technology has become transparent. As we move forward, the technology will continue to evolve and provide for expanding educational opportunities.

Virginia Tech is working to incorporate new technologies like DyKnow Vision (http://www.dyknow.com/vision/) and tablet PC's to increase student participation in the classroom. This initiative aligns with our overall CGEP goal to be proactive in ensuring that programs take advantage of state-of-the art technology and provide our learners with educational experiences that are challenging and stimulating. Over the past 25 years, nearly 50 courses have been added to the original 16 for a total of 65 current course offerings. Within this growth, the establishment of nanotechnology course offerings in 2005 is particularly noteworthy. We are also looking beyond the horizon by researching ways to offer our courses to alumni working abroad. Virginia Tech's technology and outreach strategic plans will be carried out by our newly titled Office of International Programs and Information Technology. Such changes are a part of CGEP's overall evolution since 1983 and reflect this unique program's ability to adapt to the critical needs of today's working engineers.

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View a video on demand file of a six minute CGEP promotional video. http://light.vbs.vt.edu/adhoc/spring2008/Education_from_the_Sky_CGEP_1993.mov

ADVISORY BOARD

The Commonwealth Graduate Engineering Program Advisory Board was formed in 2003 to enhance CGEP's service to the Commonwealth of Virginia as the distance-learning provider of post-baccalaureate education for practicing engineers and scientists who want to maintain and enhance their skills. The CGEP Advisory Board is expected to provide:

- Strategic Focus
- Customer Focus (Student or Employer)
- Employer Focus (New Customers)

The Advisory Board is composed of 16 individuals who can bring value to CGEP. The members are not necessarily employed by industry. The value of an individual member shall be defined by his or her ability to provide strategic, customer, or employer insight. The Board meets twice a year. Co-Chairs are appointed among the Advisory Board members. The CGEP Directors from the five participating universities attend all meetings.

In Memoriam

Dr. G.V. Loganathan

Virginia Tech Professor, Civil and Environmental Engineering and CGEP Instructor

Died April 16, 2007

"Professor Loganathan was an exemplary educator who cared greatly for his students and their well-being," said Dr. William R. Knocke, head of the Via department. "He was a kind soul, pure in heart, who taught us through his words and actions how to answer the calling to be a teacher, a mentor, and a beloved friend."

A Virginia Tech Professor Remembers the Early Years of CGEP

C. Patrick Koelling
Virginia Tech
Grado Department of Industrial and Systems Engineering

I remember the "good ol' days" of satellite. I taught many times via satellite. The best, and worst, part about that was that my parents, who had a satellite dish, were able to watch me every Wednesday night (why they would subject themselves to such punishment escapes me). My mother would often call after I got home, usually to mention something about me not looking quite right and asking if I felt OK. I sent a Final one semester to my father, who did quite well! I also made some snide (joking) comment about my physician, who I knew also occasionally watched (again, why?), and he mentioned it at my next appointment. (He happened to be the brother of a large donor to ISE.) Amazingly, I also had someone stop me in an airport informing me they had taken my class. Of course, I had never seen him; he picked up the signal in Iowa, as I recall.

In 1988 or 1989 (I think) I was assigned to teach a CGEP class in Richmond, live. As I was told by someone at the time (I don't know if he or she knew the facts or not) it was cheaper for me to travel to Richmond to teach than it was for the satellite time. In any event, my usual schedule was to drive to Roanoke, catch an early afternoon flight to Richmond (on the wonderful Piedmont Airlines!), teach my evening class, then catch the last flight out of Richmond to Roanoke, then drive home. It made for a long day, but ONLY one day. I'm sure it was expensive! But, I also know that at that time Piedmont was offering double or triple miles so the frequent flyer miles piled up very quickly! Also, I had an interesting experience one evening after class when, after boarding the Boeing 737 that would fly me to Roanoke, I discovered that I was the only passenger on the flight! I got wonderful, first-class service for the 20 minute flight. Can you imagine any airline today sending a flight, especially on a large jet, with only one passenger?

The move to newer video systems was not a difficult one, and the ability to have two-way video is really helpful to an instructor.

But, with all of this, I would have to say the very best part of teaching a CGEP class is working with the VBS *[Video/Broadcast Services]* people. I think my favorite times were not in interacting with the students (which I enjoyed), but in interacting with the VBS technicians over the years. What a joy to work with people who are so willing to help, and so fun to be with, and so very good at what they do.

I don't know what the next 25 years will bring--but it's hard to imagine it can beat the past 25 for CGEP!

CONGRATULATIONS TO RETIREES

Jack Gwinn, who for many years served as a very capable and conscientious director at the Lynchburg Center for Advanced Engineering. He retired in June, 2007

L. Thomas Overby

Served as CGEP Director at Virginia Commonwealth University for a number of years. He tried to retire from VCU several times, and has essentially succeeded since June 2007. He's now relaxing in a vacation home on the beach

Dr. James M. Davenport

Taught a Statistics class from Virginia Commonwealth University which was used by many students as part of their plans of study. Dr. Davenport taught this class every Fall semester for most of the years that CGEP has been in existence. He retired in May 2008.

And to other instructors at all of the CGEP universities who have retired within the last few years. We won't try to mention them by name, for fear of leaving someone out, but there have been many who have contributed countless hours toward the success of our program. We thank you for your efforts.

CGEP - Dedicated Distance-Education Instruction

William W. Roberts, Jr.
University of Virginia, Commonwealth Professor of Engineering & Applied Science, Director of Applied Mathematics

This Fall, 2008, it will be my pleasure to again teach Engineering Mathematics I on TV through the Commonwealth Graduate Engineering Program [CGEP]. Indeed, it will mark the tenth occasion that I have taught either Engineering Mathematics I or Engineering Mathematics II as graduate distance-education courses through CGEP.

The Program in Applied Mathematics [APMA] coordinates and administers mathematics instruction to undergraduate students and graduate students in all departments of the School of Engineering and Applied Science at the University of Virginia. The mathematical tools and expertise developed in these APMA courses, including the graduate Engineering Mathematics I and II courses, are essential to the professional development of the engineer and applied scientist. This instruction forms the core of the analytical-mathematical component of an engineering and applied science education and lays the foundation for ongoing professional development.

Question:
Why should we teach the graduate Engineering Mathematics I and II courses on TV through CGEP to distance-education students?
Answer:
The professional careers of many active engineers depend strongly on the analytical skills and mathematical expertise developed in Engineering Mathematics I and II. To be sure, Engineering Mathematics I and II help students learn in more depth and retain more completely the underlying mathematics needed in subsequent higher-level engineering courses. Engineering Mathematics I and II help students become more confident as their mathematical knowledge and abilities are improved to enhance their engineering skills.

If we believe that the graduate Engineering Mathematics I and II courses are essential to the professional development of the engineer and applied scientist and if we believe that this instruction forms the core of the analytical-mathematical component of an engineering and applied science education and lays the foundation for ongoing professional development, should we not reach out through CGEP to those dedicated distance-education students who need this mathematics instruction to be successful in their professional work and in their careers?

A little over a decade ago when I made the decision to teach my first TV course through CGEP, this above question was one of a handful of questions asked of me by a colleague who was critical of the distance-learning process. He was quick to point out that substantial extra effort was needed to teach CGEP courses. Other related questions asked of me over the years penetrate to the depths of the fundamental importance of CGEP distance-learning. Some of these questions and answers, restated below, point to the question: "Why should a professor consider teaching through CGEP?"

Question:
Could you address the rumor that the effort of teaching distance-education students on TV requires double or triple the effort of teaching on-campus students in the regular classroom setting?
Answer:
It is true when teaching for the first time on TV that substantial extra work is required; but for subsequent teaching of the same course on TV the extra required work is less.

For Engineering Mathematics I and II, there are several needed preparations which increase dramatically the effort required by the professor when teaching for the first time on TV. In the distance-learning setting, detailed lecture notes are essential for the students to have in hand prior to each lecture in order for the students to be able to more easily follow the lecture. These must be prepared by the professor and posted online prior to each class. Detailed solutions to all homework and other selected problems must be prepared and posted online each week. Detailed solutions to all Test problems also must be prepared and posted online shortly after the Tests are completed. These detailed preparations and postings are not as stringent for an on-campus course in the regular classroom setting.

Finally, the delay times in receiving the homework assignments and the Tests from the remote TV Sites for grading can be as much as several days to a week. Sometimes considerably greater delay times are experienced for those distance-learning students who must travel in connection with their regular professional work. For classes with large numbers of distance-learning students, these delay times can introduce considerable burdens not otherwise encountered when teaching on-campus students in the regular classroom setting. However, considerable help has been provided by Mrs. Rita Kostoff, the CGEP Administrator at the University of Virginia, to minimize these burdens.

Question:
Does teaching to distance-education students located at remote TV Sites preclude or hinder the ability to effectively deliver high-quality mathematics instruction to the on-campus graduate students in the same course?
Answer:
For the Engineering Mathematics I and II courses, it is my sense that the quality of the mathematics instruction taught on TV through CGEP is just as high as that of the mathematics instruction taught to on-campus students in the regular classroom setting.

It is the case that CGEP courses are taught in a smaller room, the TV lecture room, than the classrooms available for on-campus courses. Even though the numbers of on-cam-

pus students officially enrolling may exceed the limited number of seats available in the smaller room, I do not recall ever having to turn away on-campus students from taking any of my TV courses taught through CGEP because Mrs. Rita Kostoff, the CGEP Administrator at the University of Virginia, kindly makes special efforts to accommodate any such overflows of on-campus students so that they can receive the live lectures simultaneously in an adjacent on-campus TV room.

Question:
What are the most memorable positives that you have encountered in your distance-learning teaching through CGEP which would encourage your continuing to teach through CGEP?
Answer:
The feedback and comments which I have received from the students in my Engineering Mathematics I and II courses over the years have been deeply gratifying. Many of the most appreciative of these students have been my distance-learning students through CGEP. They have thanked me over and over again for my teaching efforts. These distance-learning students generally are employed full-time, often traveling extensively for their employers, and have family responsibilities as well. Many have emphasized if it were not for these teaching efforts through CGEP that they would not be able otherwise to obtain the mathematics instruction they need. They have indicated that it would be impossible for them to go back to being full-time graduate students because it would require them having to give up their yearly income and support of their families in the process.

Question:
Have any of your former CGEP students provided comments which might be viewed as representative of the distance-learning students' perspective?
Answer:
The following are comments quoted from one distance-learning student after his completing my Engineering Mathematics II course: APMA 642.

"As a young professional taking graduate engineering classes, I appreciate your teaching APMA 642 Engineering Mathematics II. The course material is very challenging, but the problem-solving techniques learned in this class have a wide variety of applications. For example, APMA 642 teaches solving non-homogenous partial differential equations via Green's functions and Fourier transforms, which are respectively applied by the Electromagnetic Interference group and the Radar shop at my work."

"Although the course material is difficult, you provide several opportunities for working students to succeed. Lecture notes, homework solutions, and test solutions are available online as study aids. Traveling students can view missed lectures online, as well. Your grading is fair and you are willing to work with students around their schedules. One notable example is when you adjusted the test schedule for a student who was expecting his first child. Also, I have contacted you for help several times during office hours and through email, and you've provided suggestions to help me complete my coursework while on travel. Throughout the semester, you've shown a mastery of the subject matter and a genuine concern for your students."

"It is difficult to take graduate classes, especially while working at a full-time career. However, because of the resources you provide for this class, working students can focus on learning the material without neglecting the rest of their lives. Committed students will find that taking this class will better prepare them with a stronger background in mathematics, and I believe those who pursue a graduate degree in engineering will find that APMA 642 is worth the effort."

Question:
What should encourage a professor to consider teaching through CGEP?
Answer:
Faculty members in the School of Engineering and Applied Science are expected to have a genuine and sustained commitment to excellence in teaching. According to the mission statement of the School of Engineering and Applied Science, we are to be a student-focused school of engineering and applied science educating men and women to be leaders in technology and society and contributing to the well-being of our citizens through the creation and transfer of knowledge. Therefore, should we not reach out through CGEP to dedicated distance-education students with our commitments to excellence in teaching and make possible this mission-pledged transfer of knowledge to help them succeed in their lives and in their professional careers?

Reflections on CGEP and the Internet

Scott F. Midkiff
Bradley Department of Electrical & Computer Engineering, Virginia Tech

As the Commonwealth Graduate Engineering Program completes its 25th year of service to Virginia, and as I reach the 15th anniversary of my own participation in CGEP, it is worth reflecting on how the program has changed over the years – and how it has not. My own research and teaching focuses on networking, so the most striking changes to me have been brought about by the Internet, which has changed so many things in our lives.

The Internet has clearly had an enormous impact on how CGEP delivers instruction and deals with the logistics of course management. In the "old days" of the 1980's and the early 1990's, handouts, assignments, and student submissions were sent between instructors and students via the U.S. Post Office, overnight mail, and fax. This evolved to electronic mail and, today, is mostly done using

a web-based course management system. And, back in those old days, out-of-class communication usually required a telephone call. Electronic mail then became the preferred mode of communication and student-teacher interaction today is most often achieved through a mix of electronic mail, synchronous chat and collaboration tools, and asynchronous discussion forums. Even lecture delivery has been transformed by the Internet. In those old days we had one-way video (via satellite) and two-way audio (via a phone bridge) sessions that were relatively expensive per class hour. Today, lectures are two-way audio/video sessions with a separate view of the instructor's presentation, all carried for "free" on the Internet. (Of course the classroom and network infrastructure are far from free, but classroom infrastructure costs are fixed regardless of the number of classes using the room and the network infrastructure is shared by many users and applications.) Students had to go to a library to view videotapes of recorded classes; today they are accessible via online video archives. CGEP has clearly leveraged the Internet to create a drastically more time-efficient and cost-effective program. And, perhaps most importantly, the Internet has enabled a far more pleasant experience for teachers and students, with less concern about time and logistics and, it is hoped, more focus on teaching and learning.

It is perhaps also equally striking how little the Internet has changed how we teach and what we teach in CGEP and in most other higher education programs. Of course, we cover new topics related to the technology of the Internet and the web in electrical and computer engineering and computer science classes and the impact of the Internet on engineering practice has changed some of what is taught, but the fundamental nature of what we teach and how we teach has really changed very little. In many ways, this is a good thing. Our current pedagogical models have withstood the test of time. And, with the help of technology, many more instructors have been able to make the transition from the traditional classroom to CGEP, bringing classes on cutting-edge topics and new energy into the program. But, I do wonder why the Internet – which has drastically changed how we buy books and airline tickets, listen to music, search for information, monitor our favorite sports teams, and keep in touch with friends and family – has made such a small difference in how we teach and how our students learn. And, given the vast amount of information and computational resources readily available to students and the practicing engineer, we need to rethink what our students need to learn. Knowledge of facts and of how to apply standard processes and methods are becoming commodities. Success in an increasingly competitive global market and advances in solving the pressing problems of society will require more. We need to figure out how to best prepare engineers for this challenge.

While CGEP has come far in the past 25 years, including its use of Internet technology for course delivery and communication, I believe that the most exciting – and important – times lie ahead. While it is hard to predict the next hot technology, I have no doubt that new unanticipated and amazing technologies will become available. The challenge for those of us in higher education, and especially those of us involved in far-reaching and high-impact programs such as CGEP, is to utilize the technological advances to not only significantly improve instructional delivery, but to dramatically improve engineering education.

25 Years of CGEP from an Administrator's Viewpoint

By Rita F. Kostoff, University of Virginia

While I haven't been an Administrator in CGEP for the entire 25 years, I have experienced the last 18 of them. I can't imagine that the first seven years were too much different administratively than when I first arrived at UVA in 1990. Rather, the course schedule had settled down to eight classes a semester, receive sites had been set up, and there was an established routine for instructor assignments and for handling course materials.

If an instructor wanted his students at the remote sites to have handouts by a particular class session, he had to provide them to me a week prior to the class date. I would make one copy for each site which received that particular class; then prepare and mail packages to the site coordinator. The site coordinator would photocopy enough copies of the handout for the number of students in that class and make them available by the class date. It was hoped that all of this would work on schedule, because if it didn't there would be many phone calls from site coordinators and students looking for handouts (and the instructors would hear from them, too).

Remember, in the earlier days, there was no email. There was no internet. (I had just learned to use a computer a couple of years before I came to UVA.) The fastest way we had to send material was by fax, and that wasn't very reliable and the quality was poor (thermal paper). I routinely used the U.S. Postal Service (with my own postage meter) to send packages (even to the far-away sites like Iowa, New York, and Pennsylvania). Surprisingly, this was part of the equation that worked just as well (or better) than it does today.

Not too long after I came here, we got introduced to electronic mail. But, the method for sending emails was difficult to use. Also, many of our receive sites were not at the same level, technologically, as the universities, so this method of communication did not become the main mode for a number of years.

How would we live without the internet today? Less than 20 years ago, we didn't have the immediate access to the World Wide Web. I can't imagine not having the instant gratification of searching for just about any subject you want to know

about. Not to mention the way we use the internet for our Program today. The instructors have their web sites, on which they post course materials, which they can do up to a few hours prior to class (rather than a full week). Students always get their handouts on time, since they can download them from the web site. Instructors use sophisticated teaching tools, such as Blackboard, Toolkit, and Collab.

In the early years, each administrator had to update and type up their university degree program information and make it available to all sites (by mailing hard copies), so that the sites could provide copies to prospective students. Prior to each semester, we had to obtain the course syllabi and textbook information, and send packets of copies to each receive site. Now, all of the participating universities maintain web sites, on which course schedules, calendars, degree program descriptions, and much other information is posted and kept up to date. Receive sites are notified when schedules are posted and can access this information as needed. The students can refer to a web site to obtain a schedule or syllabus. When it's time to distribute an in-class exam (which still must be handled by the site coordinator or technician, rather than by a class web site), the distribution is by email. When it's time to return those exams, the method is UPS or Fedex. At UVA, we've been holding open houses by videoconferencing, which means we make presentations to several sites at once, rather than using time and money to travel to each of those places.

All of the above-mentioned advances in technology and methods does not mean that the administrators have less to do. It just means that our duties have changed from manual administrative work to electronic administrative duties. Someone has to maintain those web sites. There are more emails to answer than there used to be letters. Some new problems have developed because of the electronic age (spam, computer viruses). We have to learn to use computer software. There's new equipment to learn about. Right now, in my office, I have a new computer (with new, updated software). I'm using two monitors (one of which displays our calendars and my email at all times). I have two printers, a digital sender, and a fax machine in my office. (I also have a typewriter, which I refuse to give up.). We have to adjust to the new technology within our program and the way classes are transmitted. We have to learn about new programs (Nanotechnology) and how they work within the program.

My years at UVA have been enjoyable, mainly because of being involved with CGEP. Being in the distance education field is the way of the future. It's been a pleasure working with the staff and faculty at the other CGEP universities. I've had a good experience working with all the faculty and staff from the degree program departments at UVA and have made contacts that I wouldn't have otherwise.

It's very obvious that I don't like to change jobs (this is only my second, from which I hope to retire one of these days). However, if I'm looking for change, all I have to do is wait, and that will happen within the program. I only wish that there wasn't such a turnover among staff at the other universities. We need continuity, and it helps to have some history with the program and to know how things are handled – even if some times you might tend to comment about "how things used to be done".

The following comment was written on a UVA course evaluation by a student at Northern Virginia:

"The ability to engage in graduate study from remote locations is a great thing. It facilitates and encourages continued education especially for those juggling academics and a professional career. I think it establishes a valuable interface between academics and professional work."

A Successful Grad Comments about His Experience with CGEP

Bill Dittenhofer, UVA CGEP Graduate, presently employed at HP, Fort Collins, CO

I am a graduate of the distance learning program, MEEE. After being accepted in the program, I had to move to Colorado with 5 courses left to complete. The staff and professors at UVA bent over backwards to assist me. I was sent both videos and course material, and finished my degree in 1993. I had great support, and frankly wouldn't have been able to finish without it. One of many key factors was the attitude of both the staff and the faculty toward distance learning. Additionally, the course work was varied and valuable, giving me an edge I couldn't have gotten via work experience alone. I have held positions as team lead, architect, and manager in such diverse assignments as design, verification, modeling, architectural exploration, and performance prediction. I credit the distance learning program as giving me the education I needed to step into these positions.

Web Site:
http//cgep.virginia.gov

CGEP Grads Recognized at CAER

CGEP graduates were recognized at a special meeting at the Center for Advanced Engineering & Research in Lynchburg. ***Pictured, left to right:***

Van Hanson, ME, EE-VT, 1998, MBA-VT, 2003; presently Engineering Manager at Andrew Corp.
Mary Anne Kerr, ME, EE-UVA, 1992; presently Sr. Principle Engineer at Babcock-Wilcox
William Dolenti, ME, Eng. Mgmt.-ODU, 1994; presently Engineering Manager, Flowserve
William Pfister, ME, EE-UVA, 1992, ME, Eng. Mgmt-ODU, 1999; presently Sr. Principle Engineer, Babcock-Wilcox
Rahul Mann, ME, Eng. Admin.-VT, 2008; presently Systems Engineer at Tyco M/A-com
David Van Donsel, ME Eng. Admin.-VT, 2000; presently Plant Engineer, Centra Health

David Van Donsel Comments on CAER/CGEP

It was shortly after I joined Centra Health in 1995 that I enrolled in the graduate degree program through the local Center for Advanced Engineering office. With my job responsibilities moving more towards administration and away from the technical side of engineering, I needed to enhance those skills. The Systems Engineering principles, included as part of the M.E.A. curriculum, complemented very well the skills that I had learned in a bachelor's degree program.

Since that time, Centra Health has invested heavily in updating aging infrastructure, increasing utility capacity, and adding patient care and treatment facilities at many of our sites in the South Central Virginia region. With the master's degree from Virginia Tech, I have been able to support this extensive and ongoing construction effort.

On a more personal level, the graduate degree has been a significant accomplishment for me and has provided financial rewards as well. It is the result of much effort and will surely be an asset if I should ever need to seek employment elsewhere.

Bill Pfister Relates How CGEP & CAER Met His Education Needs

In 1986 I was a member of the first CGEP class held in Lynchburg using 1-way video and 2-way audio using the phone bridge. Since then, I have completed a Master of Engineering (Electrical Engineering) degree from the University of Virginia, moved to Indiana for several years, returned to the Lynchburg area, completed a Master of Engineering Management degree from Old Dominion University, and am now a member of the Board of Directors of the Center for Advanced Engineering and Research.

Flexibility was a major advantage of the CGEP program. I was able to create a program of study that addressed my interests in machine controls and robotics incorporating classes held in Lynchburg, on-grounds in Charlottesville, and completing the Master of Engineering degree (project course) after transferring to Indiana.

The technical content from the coursework was applicable to my job and was helpful in preparing for and passing the PE exam.

ODU's Project Management class sold me on the MEM program. The instructor was knowledgeable and had real-world experience which he sprinkled into the class. The material provided additional depth to concepts I'd only been briefly exposed to in the workplace. The core courses exposed me to financial, statistical, and behavioral aspects and forced me to work on my analytical and writing skills that I still benefit from.

The electives for the MEM program provided an opportunity to explore some technical areas out of my comfort zone. I ended up taking classes form all 4 CGEP Universities in disciplines including electrical, systems, and industrial engineering. Two of the classes were directly related to work I was doing at the time, so I had the chance to do homework at night and apply it the next day at work.

UVA Student at Institute for Advanced Learning and Research

IALR's most recent CGEP participant, ***Arthur Coleman****, works at Luna Nanworks in Danville.*

"When I moved to Danville, my plan was to stay here temporarily until I was able to start my master's degree at the University of Virginia and then move to Charlottesville. I was planning to reluctantly sell my house and move to Charlottesville in early 2008, but thanks to the Institute for Advanced Learning and Research, I can continue to live in the community I love here in Danville and pursue my degree with UVA."

This newsletter was prepared by Rita Kostoff, University of Virginia. Thanks to all who contributed and to those who assisted in soliciting articles.