

**Engineering**

**Continuing and Distance Education**

**Annual Report**

**2005-2006**

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## Table of Contents

PREFACE .....	1
Introduction .....	1
Challenges this year .....	1
Accomplishments this year .....	1
Opportunities for the future .....	2
MISSION AND VISION AND OPERATING ENVIRONMENT .....	4
Mission .....	4
Vision .....	4
Operating Environment .....	4
The College of Engineering .....	4
The University .....	4
The Market .....	5
C&DE STAFF .....	6
Roles and Responsibilities .....	6
C&DE ACTIVITIES DURING THE PERIOD .....	8
Major/Significant Activities .....	8
Nuclear Engineering Distance Graduate Program .....	8
Development and Delivery of Distance Courses for Industrial and Manufacturing Engineering .....	8
Development of a Distance Version of EMCH 13 .....	8
Development and Implementation of New Distance Instructional Technologies and Techniques .....	9
EE 305 Distance Course .....	9
Smoke Schools .....	9
Airport Conference .....	9
Society of Engineering Science (SES) 2006 Annual Meeting .....	9
Design of Experiments Training for Gentex .....	9
International Journal of Service Learning in Engineering .....	9
Center for Sustainability .....	9
Move from Rider II to Engineering Unit C .....	10
Proposals for Dedicated Distance Education Space .....	10
Other Activities .....	10
Distance Education Activities .....	10
Continuing Education Activities .....	11
General Support Activities .....	11
PROGRAMS DELIVERED BY OUTREACH DELIVERY UNITS .....	13
Conferences and Institutes .....	13
World Campus .....	14
Continuing Education at University Park .....	14
WPSU .....	15
CURRENT AND FUTURE ACTIVITIES .....	17
2006/2007 Activities .....	17
Planned Future Activities .....	17

MAJOR ACCOMPLISHMENTS .....	18
SUMMARY .....	19
ACKNOWLEDGMENTS .....	20
APPENDIX A - C&DE ACTIVITIES IN THE COLLEGE, BY UNIT .....	21

## PREFACE

### Introduction

This report summarizes the activities of the Engineering Continuing and Distance Education Office, C&DE, from late 2005 through 2006. This period was a time of challenge, opportunity, and accomplishment for the office.

### Challenges this year

The major challenge for C&DE during this period was how to continue servicing our students and faculty in light of our move from Rider II Building to Engineering Unit C.

Any office move tends to disrupt operations, but this one was particularly onerous for two reasons. First, it came at the beginning of the fall semester and, second, we lost the use of the dedicated video classroom we had been using in Rider II. In the midst of the physical move, we had to scramble to find rooms in which to hold our scheduled fall classes; then, we had to shuffle equipment around to meet our technology needs in those rooms.

While we were thankful for the priority access we were given to University and College classrooms, we quickly found that using scattered classrooms with a variety of technologies and equipment was neither efficient nor effective. We also found that the technical capabilities we expected and required were far beyond what was available in a standard University distance education classroom.

When we explained our plight to Dean Mason and others, they were very supportive of efforts to have the University transfer a classroom to the College for dedicated use as a distance education classroom and development laboratory in the Engineering core of campus. This led to our preparing numerous proposals to the University, all of which were rejected. Finally, in October 2006, the University agreed to give us Room 327 Sackett at the end of the 2007 spring semester. We will turn that room into an outstanding space for distance education development and instruction, instruction of parallel resident sections, and video conferencing.

Despite the challenges, C&DE was able to meet the College's obligations to existing students and to develop several new courses.

### Accomplishments this year

During the past year, the C&E office had a number of significant accomplishments, for example:

- We raised the awareness of C&DE within the College by creating promotional materials and making presentations to eight College units.
- We worked with the IME department for the first time, developing and offering two IE courses in a distance education format – IE 552, *Mechanics of the Musculoskeletal System*, the first course in the IME's Human Factors and Ergonomics certificate program, and IE 327, *Introduction to Work Design*.
- We worked with faculty and departments to offer twelve independent study / distance education courses. Seven of these were in the Nuclear Engineering program, which will soon see its first MEng graduates. Others were for EE, IE, and BioE.
- We captured on video, for web posting or other later use, numerous lectures and presentations, including: Dr. James Duderstadt's talk, NucE seminar lecturers, Barbara Shaw's Corrosion Short Course lectures, and two of the Research Unplugged lectures.

- We enhanced our ability to capture and distribute course content through: the construction and deployment of two semi-portable equipment racks with video conferencing, recording, and streaming capability; equipping of rooms in Hallowell and the Transportation Building with video capability; developing techniques for the use of notebook PCs in course instruction; and learning how to incorporate a SmartBoard into a video course.
- We supported College short courses, conferences, and workshops. This year we: arranged a faculty workshop at the Airport Conference (600+ attendees), provided registration and logistics support to the Host Committee for the 2006 annual meeting of the Society of Engineering Science (275 attendees), and supported the 9<sup>th</sup> Heavy Vehicle Weights and Dimensions Symposium (57 attendees).
- We supported faculty proposals, research, and outreach by: providing input for the successful MAUTC and the Rotorcraft Center of Excellence proposals; implementing a new on-line journal, *The International Journal for Service Learning in Engineering*, which has now published two issues; and providing financial support and advice to the Center for Sustainability. We also provided videoconferencing facilities and support that enabled faculty researchers to efficiently collaborate with distant sponsors, often at times outside our normal working hours.
- Members of the C&DE staff collaborated with Nuclear Engineering faculty in authoring two technical papers describing the NucE distance graduate program.
- We supported the recruitment of quality Engineering graduate students by preparing a presentation, including video testimonials, for use in recruiting students from the French Ecoles Centrales
- We supported University Park students by: providing advice to the CERS organizing committee; assisting the student chapter of ASME with videoconferencing with campuses and industry; and by providing advice and services to students applying to take the FE examination. We also provided support for resident students taking the parallel resident sections of distance courses.

These accomplishments provide a firm base upon which to build for the future.

### **Opportunities for the future**

The C&DE Office prides itself on its customer orientation and service for all our clients – faculty, resident students, distance students, and others. As an example of our commitment to customer service, the C&DE personnel often work outside the normal 8-5 schedule, because that's what is required to get the job done.

As with most enterprises, the word of good service and a quality product gets around, and new customers come in. This phenomenon, coupled with our presentations to departments, has generated significant interest in our services. Now that more people know who we are and what we do, we are seeing more inquiries about help with outreach sections of proposals, possible conferences, and possible distance courses. We always try to accommodate new opportunities, but, this year we were limited in the number we could take on due to prior commitments and facility limitations.

In addition to a heightened awareness of C&DE, there are other factors creating opportunities for future work. One of these is the migration of distance education procedures and technology into resident instruction. The university is seeking to create instructional efficiencies through blended learning courses and by sharing courses across campuses through the e-learning cooperative. The techniques that can be used to accomplish those goals are ones we have

been using for years in our distance courses. Therefore, C&DE can assist the College in the implementation of blended and shared courses. We have had preliminary discussions about this and expect to see the area grow over the next several years. We are currently in the final stages of development of EMCH 13, a course that will serve a broad audience of distant students, students at campuses, and even resident students. We will pilot our EMCH 13 course during the spring semester 2007 and begin offering it next summer.

Following are a few of the opportunities that we see for the future.

- Expand the College's portfolio of distance course offerings in areas such as IE, NucE, Aerospace, Transportation, and Leadership.
- Expand the College's offerings to include new blended learning courses and courses to other Penn State campuses.
- Promote conferences as a way to showcase an academic program and enhance its reputation. Work with faculty to develop new conferences.
- Bring new students into existing programs. For example, people from the Navy's Nuclear program into the NucE program.
- Continue improving the richness and effectiveness of resident instruction through exposure of resident students to the technologies and procedures used in distance courses.

We can help facilitate these opportunities, but, as with all our activities, we will need the active support and involvement of the College, the departments, faculty, and the University. More about this in the following section.

## MISSION AND VISION AND OPERATING ENVIRONMENT

To understand the C&DE enterprise, one must first necessary to understand the unit's mission and vision and the environment in which it operates.

### Mission

***To champion and facilitate the development and delivery of high-quality Engineering educational outreach programs that meet the needs of a target audience; thereby: showcasing the College's expertise, providing networking opportunities, and enhancing the reputation of the College.***

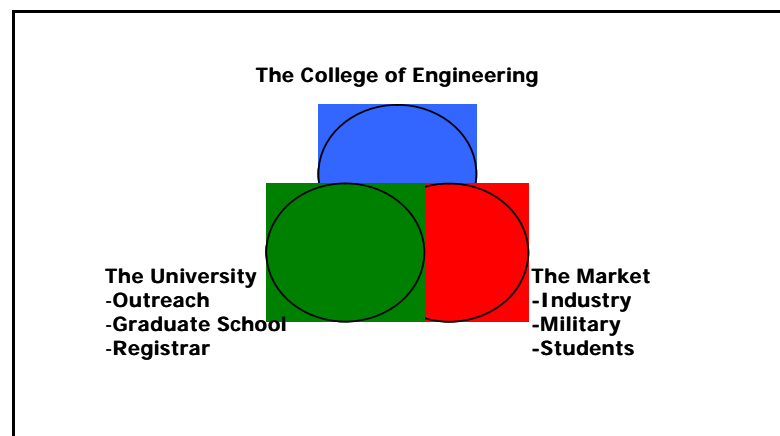
### Vision

***To establish the College of Engineering as a premier provider of high-quality Engineering educational outreach programs to business, industry, and learners everywhere.***

### Operating Environment

The Engineering C&DE organization operates within an environment defined by the unique characteristics of the College of Engineering, Penn State, and the Market, Figure 1. Each element of this environment has its own unique characteristics.

The College of Engineering – The College has a huge reservoir of talent and expertise that could be delivered to the Market, but the faculty and departments often perceive that it is in their interests to pursue other activities, such as research, than to participate in C&DE programs. However, once departments or the faculty start working with us, they continue. That is why we made an effort this year to visit departments and stimulate interest in C&DE by showing what we do and why it can be advantageous. Appendix A contains a table that shows the outreach activities of each College unit.



**Figure 1.** C&DE's Environment

The University – The Penn State part of the environment is complex, but can be very useful. For example, the Penn State “brand” is an asset when dealing with the market. C&DE has to consider and work within parameters set by such diverse Penn State organizations as the Graduate School, other Colleges, Admissions, and University Outreach.

The University Outreach organization has been established to service the Colleges by providing a mechanism for linking to and servicing the Market. In many cases, such as large conferences, they can be very effective. In other cases, such as dealing with a specific company or industry, a combination of the faculty, the department, and Engineering C&DE can be more effective. For example, we believe that the Nuclear Engineering program has been successful because the majority of program tasks have been handled within the College.

Enlightened University Outreach units have recognized this and have structured their operations to encourage such partnerships. Other Outreach units have tried to maintain their monopolies and organizations through restrictive University policies. C&DE's knowledge of the PSU Outreach organizations and policies allows us to guide College units toward the best arrangements for their particular purposes.

The Market – Finally, there is the Market – the unforgiving, free market – where expectations are high, the competition is fierce, and only the best survive. Following are a few observations about the market.

- The market for engineering continuing and distance education is not a captive market, like resident students who, once committed, have little choice or buying power. The buyers in our market have choices, and they will go elsewhere if our products and services don't meet their expectations. Therefore, we have to provide what they want, when they want it, where they want it, and in the form that they want it.
- Contrary to popular belief, we have found that, there is no need to compromise rigor or quality of our courses by "dumbing them down" for non-resident students. Our target buyers expect and value high quality and rigor. They are astute, and they will not be fooled by cheap imitations. There is and should be no difference in content and rigor between a resident course and one taught by distance.
- While the buyers in our market value quality and rigor in the academic content, they are highly intolerant of inept performance teaching and bureaucratic red tape.
- Our target buyers are relatively price insensitive.
- The best marketing is often through word-of-mouth. Many clients find us after a positive referral from a colleague.
- The buyers expect it to be easy to learn about and access our products. A good web page helps, but, ultimately, it comes down to dedicated, customer-oriented people. This is an area where C&DE excels.

The Nuclear Engineering distance graduate program provides a prime example of how a program can grow and be successful, with careful attention to managing all the elements of the environment. We have worked with the faculty, to help them provide quality materials in formats that are easily accessible to the students. We have worked to provide excellent service to the students, providing a one-stop interface with the University and the faculty. And, we've managed the relationship with the World Campus delivery unit to get the best financial deal for the College and department. The program's growth and success is a credit to all the participants.

## C&DE STAFF

People are the heart of any operation and the key to its success. The C&DE staff is dedicated to the success of the unit's mission. For a small number of people, their accomplishments have been significant.

### Roles and Responsibilities

Staff activities can generally be divided into the following broad categories:

- Program Discovery
- Proposals and Marketing
- Program Design and Development
- Program Delivery
- Program Review and Evaluation
- Program Enhancement
- Personal development

During the past year, the C&DE staff consisted of the following people, with the indicated roles and responsibilities. Others were hired on an as-needed basis to help with programs or special projects.

Table 1. C&DE staffing, roles, and responsibilities

Person	Roles and Responsibilities
Terry Reed, Director	Director <ul style="list-style-type: none"> <li>• Champion for all C&amp;DE and outreach, with emphasis on C&amp;I and CE at UP programs and emerging opportunities</li> <li>• Coordinates with Dean Mason and department heads</li> <li>• Coordinates with University Outreach and other colleges</li> <li>• Directs and assists with projects</li> </ul>
Deb Zimmerman, Program Coordinator	Program Manager <ul style="list-style-type: none"> <li>• Champion for World Campus programs</li> <li>• Champion for video conferencing</li> <li>• Program manager for distance education programs</li> <li>• Administrative Aide</li> <li>• Assists with implementation of programs</li> </ul>
Tom Iwinski, Instructional Designer	Instructional Designer <ul style="list-style-type: none"> <li>• Champion for the application of sound instructional design</li> <li>• Proposes and implements instructional designs to insure that learning objectives are met with high quality</li> <li>• Designs and implements technical systems to capture content and produce distance courses</li> <li>• Integrates various pieces of content into distance courses</li> </ul>

<p>Vern Irwin, Instructor</p>	<p>Instructor</p> <ul style="list-style-type: none"> <li>• Champion for the Visible Emissions program (Smoke School)</li> <li>• Conducts the smoke reading portion of the Smoke Schools</li> <li>• Maintains and updates smoke school apparatus</li> <li>• Keeps current with federal and state regulations</li> <li>• Maintains client database and records</li> <li>• Cultivates the Smoke School audience</li> </ul>
<p>Bonnie King, Staff Assistant</p>	<p>Staff Assistant</p> <ul style="list-style-type: none"> <li>• Handles all C&amp;DE financial data and transactions</li> <li>• Assists with the capture of course content</li> <li>• Integrates course content into ANGEL</li> </ul>
<p>Missy Stark, Staff Assistant</p>	<p>Systems Training Specialist</p> <ul style="list-style-type: none"> <li>• Works with faculty in the video capture of course content</li> <li>• Produces high quality course materials from instructor notes</li> <li>• Integrates course material into ANGEL</li> <li>• Coordinates video conferences</li> </ul>

The following sections describe the activities and accomplishments of the staff for this period.

## C&DE ACTIVITIES DURING THE PERIOD

Following are summaries of C&DE activities during the reporting period. The more significant activities will be discussed first.

### Major/Significant Activities

Nuclear Engineering Distance Graduate Program – This program continued as our signature program and a prime example of what can happen when the department, the faculty, C&DE, and the Outreach delivery unit partner in the delivery of a program to the market. Here are a few highlights.

- Twelve sections of NucE courses were offered over the period
- A series of web pages to explain and market the program were created and posted at <http://www.engr.psu.edu/cde/nuce/index.html>
- A paper, *A Brief History of Graduate Distance Education in Nuclear Engineering at Penn State University* by L. Hochreiter, J. Brenizer, D. Zimmerman, and M. Stark, was accepted for presentation and the poster session at the PHYSOR 2006 (Advances in Nuclear Analysis and Simulation) conference.
- As word of the program spread, there were inquiries from new students and organizations. For example, a delegation from the Navy Nuclear Propulsion Program visited University Park to discuss enrolling students in the program.

With the resurgence of the Nuclear industry, this program has great potential for growth and for creating new relationships with business and government. It remains to be seen if the University is up to accepting and dealing with the challenges and issues that program growth will present.

Development and Delivery of Distance Courses for Industrial and Manufacturing Engineering – During this period, we finally offered the graduate certificate program in Human Factors and Ergonomics, which has been in administrative development with the World Campus for several years. While enrollments never materialized in the certificate program, despite World Campus' best efforts to promote it, the program gave us the opportunity to work with Dr. Freivalds on the development and delivery of IE 552. This led to the development of a distance version of IE 327, a popular introductory course. IE 327 was then offered in a distance format during the Summer of 2006. Both C&DE and the department learned much from this experience and are better prepared to work together in the future. We currently have plans to develop and offer several IE courses in a distance format.

Development of a Distance Version of EMCH 13 – The C&DE staff worked with the Engineering Science Department and Dr. A. Pytel to develop and implement a distance version of EMCH 13. The course includes: video lectures, videos of laboratory experiments, lecture notes, problems, and video explanations of the problems. Considerable time was spent capturing the lectures, laboratory experiments, and problem explanations and weaving them into a cohesive, consistent tapestry of a course. We feel that the videos and explanations are well suited for teaching Engineering content. This format differs from many distance courses, which are essentially digital textbooks with print and pictures and no lectures. The course will be offered for the first time in Summer 2007.

#### Development and Implementation of New Distance Instructional Technologies and Techniques

– The C&DE staff has developed, and continues to develop, unique ways to capture, present, and distribute College of Engineering distance courses at a relatively low cost while maintaining quality. Typically, we provide our students with all the elements of a classroom experience – instructor notes, instructor explanations, and interactions – within an easily understood and navigated framework that utilizes the University’s ANGEL system and the College’s computer and network infrastructure. Working on a limited budget and with limited support, we have developed techniques to efficiently and effectively capture and post course lectures and materials while maintaining sound pedagogy and accommodating individual teaching styles. That is a major accomplishment, which is often underappreciated.

EE 305 Distance Course – We offered EE 305 in a distance format for COOP and other students, during the Summer term. This course remains popular with students.

Smoke Schools – The Visible Emissions programs (Smoke Schools) continue as one of our largest and most popular programs. Public schools are offered twice a year at three locations - Allentown, McKeesport, and University Park. The schools have a loyal following, partly because of the knowledgeable and customer-friendly staff and partly because they are mandated by law. C&DE works with FEI to coordinate participation of PA Department of Welfare staff in the public programs.

Airport Conference – The annual Airport Conference continues as one of the College’s largest conferences, with over 600 participants. The conference is managed by Outreach Conferences and Institutes, C&I, for the Eastern Region of the FAA, with the College as the PSU academic home. C&DE supports the conference and promotes the College by helping identify topics and speakers for the pre-conference workshop. The 2006 conference featured a presentation by Zoltan Rado and others titled *Safety on Winter Runways: Measurement and Application of Runway Friction*.

Society of Engineering Science (SES) 2006 Annual Meeting – The Engineering Science Department, which hosted the SES annual meeting in 2002, was asked to host the meeting again in 2006 because the selected institution had backed out of their commitment. Although the time frame was short, the department agreed and established a host committee. C&DE, which was involved with the 2002 meeting, is assisting the department with the 2006 meeting. We will advise the host committee on budgeting and handle the meeting registrations and logistics.

Design of Experiments Training for Gentex – C&DE was contacted by a PSU campus rep. who had been asked by Gentex if PSU could provide Design of Experiments training for their engineering staff. We located an instructor, Dr. J. Chandra of IME, and facilitated the arrangements with the campus for Dr. Chandra to provide the training on-site at Gentex.

International Journal of Service Learning in Engineering – C&DE provided the funding, advice, and support personnel to start up and implement the on-line *International Journal of Service Learning in Engineering*, which was conceived by Dr. T. Colledge. Dr. Colledge assembled the editorial and review personnel and serves as Editor in Chief. We published the first issue of the journal during this period. See <http://www.engr.psu.edu/ijsle/index.htm>

Center for Sustainability – C&DE provided financial support for the Center for Sustainability to

help tide them over the short term. We also provided suggestions and advice on the Center's outreach programs and worked to generate interest in the Center at University Outreach.

Move from Rider II to Engineering Unit C – Because the University needed the space in Rider II for other units, C&DE was required to find and move to other quarters. After much searching and consideration, we were given space on the third floor of Engineering Unit C. We made the move in August 2005, right before the start of the Fall semester. Because we had commitments for distance classes and were losing the video classroom we had developed in Rider II, the staff had to scramble to find suitable alternate classrooms. We managed to cobble together a combination of rooms in Willard and Hammond. Thanks to SEDTAPP's generosity and cooperation, we were able to use 308 Hammond, which turned out to be the best option because of its large size and our ability to equip it with our own video equipment. Course development has suffered because of limited space in which to capture content. Any move is disruptive, but the facility issues made this one particularly so. We did, however, come out of this experience with improved concepts of why dedicated space is needed, where it should be located, and how it should be equipped.

Proposals for Dedicated Distance Education Space – To overcome the lack of dedicated space for our distance education teaching and development activities, we spent considerable time during this period looking for adequate space and preparing numerous proposals for University Committees. As the proposals were rejected, we continued to limp along and improvise. Finally, we were told that the University had accepted our proposal to have 327 Sackett transferred to the College for use as a dedicated distance education classroom and development space. The transfer will occur during summer 2007.

### **Other Activities**

In addition to the above major activities, the C&DE staff was involved in many other areas. Some resulted in a deliverable product, some will result in products in the future, some were leads that didn't pan out, and some were services to stakeholders. Following is a complete list of projects/activities in which we were involved during the period. For more information about any of these, contact the C&DE office.

#### Distance Education Activities

- Space Education Consortium Distance Courses
- Mature Driver Training
- Engagement with U.S. Navy Nuclear Propulsion Program
- Aerospace Engineering Courses to Non-RI Audiences
- Addition of SmartBoard Capability for Distance Teaching
- ESM - Laser Manufacturing, Post-Bacc. Certificate
- Buried Infrastructure Outreach
- ENGR 497C, Professional Skills and Competencies
- E SC 455 (MATSE), Electrochemical Methods in Corrosion Science and Engineering
- IME and the Southern Maryland Higher Education Center
- EE 497C Wireless Communications
- STS 101 via the World Campus
- CEE - Public Transportation Course
- NanoFab - Streaming Video Lecture
- Pennsylvania Housing Research Center Web Seminar
- E-Ship Program
- Blended Learning
- NucE Freshman Seminar

- Work on World Campus Agreements
- University ad-hoc Group, the e-Learning Alliance

#### Continuing Education Activities

- Lab Automation and Rapid Product Development course
- 16<sup>th</sup> U.S. National Congress on Theoretical and Applied Mechanics - 2010
- Biorheology Conference - 2008
- IME - Cast Metals Institute short courses
- Nanofab Courses through CE at University Park
- Engineering Environmental Institute
- Off-Campus, Experiences Through C&I
- Transportation Conferences Management
- IWASEP VI Workshop
- PTI - Advanced Work Zone Management and Design Course
- Campus College Support
- Wastewater Biology Programs
- Barnes McCormick 2006 Rehire
- PTI - 9<sup>th</sup> Heavy Vehicle Weights and Dimensions Symposium - 2006
- Review AD-03 Revisions Being Considered by the University Outreach Council

#### General Support Activities

- Rachael Brennan - Assistance with Career Grant Proposal
- CERS 2006 - Engineering Graduate Council Research Symposium
- CERS 2007
- Promotional Presentation for Graduate Studies and Research – Ecoles Recruiting
- Presentation on PSU Engineering Distance Education for T. Humphrey
- Nanofab Support
- COOP - Blended Learning Courses for COOP Students
- MAUTC Proposal Support
- ASME Student Chapter, Videoconference Meetings with Campuses and Industry
- NASA Proposal, Dr. Santoro
- Center for Sustainability)
- Support for CE at Berks
- Support for Engineering CO-OP Office
- General College of Engineering Support
- Support for Videoconferencing in 210 Hollowell
- Video Development Space at PTI
- Engineering Outreach Council
- Engineering Outreach Council Government and Industry Markets Subcommittee
- SEDTAPP - Under-enrolled Engineering Courses at Campuses
- SEDTAPP Teaching with Technology
- Shaver's Creek Academic Advisory Council
- Support for PSU Engineering Students Applying to Take the FE Exam
- Videoconferencing Support for College Faculty and Units
- Support for the CE at University Park Operation
- General Support to Campus CE Units
- Visits to Engineering Units to Publicize C&DE and Promote Outreach
- Support for Employers and Working Professionals
- Power Engineering Program Support
- Teaching and Learning with Technology (TLT) Symposium
- Outreach Marketing Research Director Search
- Hendrick Conference on the Adult Learner
- Student/Alumni/Business Support
- Podcasting and publicity for College outreach

- Video Support for ASME
- Proposal Support - PTI, LTAP Proposal
- Support for Dubois Entrepreneur Training
- Educational Program for Engineering Department Heads
- EE Guest Lecturer Taping
- Staff Training and Development
- James Duderstadt visit to Nuclear Engineering – Taping and Posting of Presentation
- Support to CE at the Dubois Campus - Energy Audits
- Creating Pennsylvania's Future - A Higher Education Economic and Community Development Summit
- 2006 Faculty Outreach Award Nomination
- Goddard Forum

## PROGRAMS DELIVERED BY OUTREACH DELIVERY UNITS

This section summarizes the programs delivered during FY 05/06 by the College through Outreach delivery units, which include:

- Conferences and Institutes, C&I, which delivers short courses, conferences, workshops, and some credit courses
- World Campus, WC, which administers the delivery of all courses delivered through technology to non-University-Park students
- Continuing Education at University Park, CE at UP, which delivers programs to students in a seven-county area of north-central Pennsylvania
- WPSU which produces and delivers audio and video programming

The level of C&DE office involvement with these programs varies. We are typically deeply involved with the World Campus programs and less involved with the C&I and the CE at UP programs. We try to stay aware of what is happening in each delivery unit and, when necessary, provide support to both the Outreach delivery unit and the College unit involved in a program.

### Conferences and Institutes

C&I coordinated the delivery of the following 17 College of Engineering programs during 05/06.

- Summer Graduate Program in Acoustics
- Modern Protective Structures
- Water Works Operators' Assoc. of PA 77th Annual Conference
- HEC-RAS
- Rotary Wing 2004
- ABMA Essential Concepts
- Visible Emissions - McKeesport
- Visible Emissions - Lehigh Valley
- Visible Emissions - University Park
- Transportation Engineering and Safety
- 28th Annual Airport Conference
- Visible Emissions - McKeesport
- Visible Emissions - Lehigh Valley
- Visible Emissions - University Park
- Flight Simulation & Avionics
- Carbons for a Green Planet
- Stormwater Management

These programs registered 2,582 people, generated \$854,947 in gross income, and \$118,518 in net income. The College's share of net income that was processed through the C&DE Office was \$74,368 or 63 percent of the total reported net. Of the net revenue received by C&DE, 85% distributed to the College unit that supports that programs. However, financially, this is only part of the story.

For several programs, such as the Summer Acoustics program and the Transportation and Safety Conference, net dollars were shared directly with the participating unit, without flowing through C&DE. Net revenue isn't the only revenue that flows to College units from C&I programs. In some cases, the program budgets pay direct expenses for faculty participation or

staff support. Because C&I may reimburse the faculty and departments directly, the total amount of this revenue is unknown.

In addition to the programs above, the College COOP students register through C&I, since these programs occur away from University Park. Under our arrangement with C&I, they retain a \$50 per-head service fee and return the rest of the COOP course tuition to the College. For FY 05/06, \$424,432 was returned directly to the College. This money came directly into the College without passing through any C&DE budgets.

### **World Campus**

The following 20 courses were delivered through the World Campus during FY 05/06.

- E E 305 07CD / 08WB /09 WC
- E E 438 02WB
- I E 327
- I E 552 01IV
- M E 515 01IV
- NUC E 403 02IV
- NUC E 408 01IV
- NUC E 420 01IV
- NUC E 460 01IV
- NUC E 497A 02-03 WB
- NUC E 512 01IV
- NUC E 525 01IV
- NUC E 530 01IV
- NUC E 597B 01IV
- NUC E 597C 01WP
- NUC E 597D 01IV
- NUC E 597K 01IV
- S T S 101 03/07 WB
- S T S 150 02VN
- S T S 432 01PW

These programs registered 140 people, generated \$188,488 in gross income, and \$144,434 in revenue shared to the College. Note that the World Campus revenue is not net revenue, but rather it is a share of the gross revenue from the programs. From the gross revenue we receive, C&DE must pay program expenses - World Campus costs, departmental costs, and C&DE charges. Since C&DE receives an up-front fee for support services provided to the programs, the remaining net goes to the department.

### **Continuing Education at University Park**

The following 26 sections of College of Engineering courses were delivered through the CE at University Park.

- CMPSC101
- CMPSC101
- CMPSC101
- CMPSC101
- CMPSC203
- CMPSC203

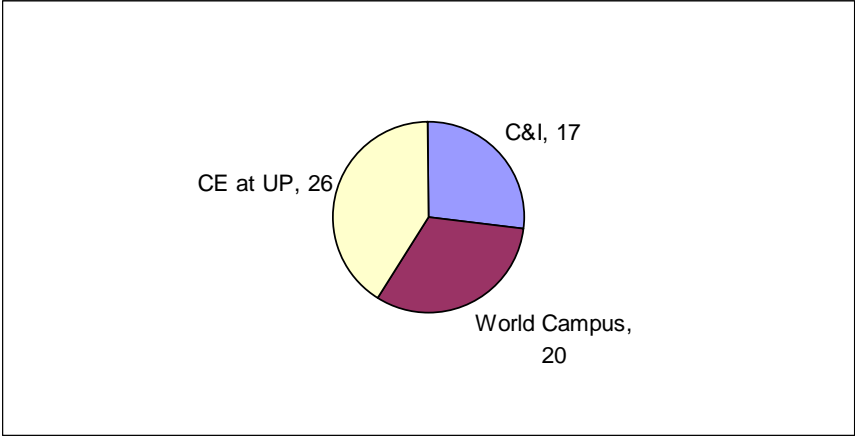
- CMPSC203
- CMPSC203
- CMPSC203
- CMPSC203
- CMPSC203
- CMPSC203
- CMPSC203
- CMPSC203
- CSE 297A
- CSE 497A
- CSE 497A
- CSE 497D
- E G 497B
- E G 497B
- ENGR 497C
- S T S100
- S T S497A
- S T S497A
- S T S497D
- S T S497I
- S T S497K

These programs registered 416 people – 42 part-time students and 374 full-time students. The courses generated \$61,983 in gross income, and returned \$6,198 (10% of gross) in revenue sharing to the College.

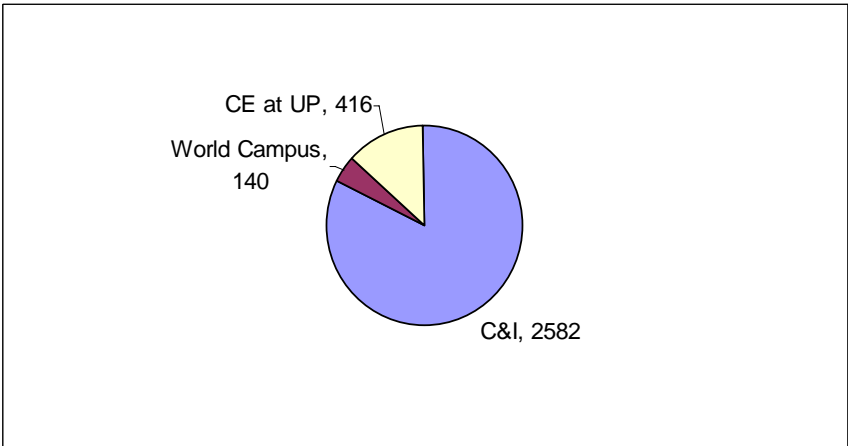
### **WPSU**

During the year, Dr. Sinha of CEE worked with WPSU to produce a series of EPA-funded educational modules to inform and educate elected officials and the public about the problems posed by decaying water and wastewater infrastructure. The modules will be hosted on a World Campus web site. C&DE supported Dr. Sinha with advice in the early stages of the project.

Programmatic data for the three major Outreach delivery units – C&I, World Campus, and CE at UP – are summarized in the pie charts of the figures below.



**Figure 2.** Number of programs by Outreach Delivery Unit



**Figure 3.** Number of people served, by Outreach delivery unit.

## CURRENT AND FUTURE ACTIVITIES

Following is a brief summary of activities currently underway and those planned for the future.

### **2006/2007 Activities**

Offer distance courses – NucE 420 and 597D, CE 497F, and EMch 13  
Complete the recruiting piece for Ecoles Centrale graduate students  
Develop distance courses – IE 419, IE 424, and EE 305 revision  
Promote development of new CSE and AEROSP distance courses, youth programming, and conferences  
Provide support for delivery units, programs, and the College  
Finalize the technical design requirements for 327 Sackett  
Design and implement a faculty newsletter

### **Planned Future Activities**

Get 327 Sackett up and running  
Continue enhancing distance education tools and techniques  
Continue servicing existing courses and programs  
Add new courses to the College's portfolio to serve distant, campus, and resident students  
Expand the number of IME C&DE courses  
Start working with new departments, particularly Aerospace and Computer Science  
Work with outside companies and consortia – the Navy, RTCs, GE, AREVA  
Make strategic investments

## MAJOR ACCOMPLISHMENTS

The activities in the sections above only tell part of the story. In many cases, they represent the preferred embodiments of unique concepts and ideas. Those ideas will live on long after the tasks are forgotten. The Engineering C&DE staff has made major accomplishments and progress over the past several years, particularly in delivering Engineering content through technology. Here are some of our major accomplishments.

- Designed and implemented an architecture for Engineering courses that includes many or all of the following: interactive video conferencing, streaming video, video on demand, animations, high quality notes and graphics, parallel resident sections, students, and videos of laboratories.
- Designed and implemented a standardized framework for distribution of course materials, using the University's ANGEL course management system
- Developed semi-portable rack systems for video capture and transmittal
- Integrated tablet PCs into teaching
- Developed courses to service COOP students
- Streamlined the student process
- Achieved high faculty satisfaction – return rate
- Achieved high student satisfaction – fewer drops
- Exposed undergraduates to distance education; thereby, creating a future market
- Pushed the boundaries on streaming video and PSU telecommunications
- Designed and implemented web sites to inform and attract potential audiences
- Designed and implemented an on-line technical journal for Dr. Colledge.

## SUMMARY

2005/2006 was a year of challenges, but the C&DE organization, with support from the College and University, met those challenges and made progress in many areas. We brought in income to help cover the costs of programs and to provide funding for investments in the future.

The market demand for Continuing and Distance Education is growing, and Penn State can be a player, if the faculty, the College, and the University perceive value in these activities. The C&DE office has the staff and the tools to assist the faculty and departments who want to participate, but we have no content expertise and cannot act alone. This is a potential growth area for the academy. It is also an area where others are competing with Engineering and other programs. The University of Phoenix, a for-profit institution, has experienced substantial growth in non-Engineering programs. Other Universities, like NC State and USC, have substantial Engineering programs. For now, the best strategy for Penn State would seem to be to concentrate on growing distance education programs in niche areas where the College has unique or outstanding capabilities – Acoustics, Nuclear, and Industrial Engineering, for example.

C&DE has the skills and resources to champion and facilitate outreach activities and to grow these activities in the future.

## ACKNOWLEDGMENTS

The C&DE staff would like to acknowledge the following individuals and organizations for their valuable help and contributions to Engineering continuing and distance education.

Sonya Leitzel, Rick Shearer, and the staff of the World Campus who worked with us as true partners.

University Outreach and World Campus leadership for recognizing that there is value in diversity of distance education approaches and ideas and for making changes in their policies and procedures to allow and support innovation.

Walt Beatty and Shan Karimushan for their support of our streaming video needs.

Bill Burkhard and the ECS staff for their assistance and support with network and computing issues.

Dr. Sathianathan and the SEDTAPP organization for working with us to allow distance classes in rooms 307 and 308 Hammond.

Dean Wormley, and Associate Deans Mason, Burton, and Engel for their diligent efforts in convincing the University to transfer a room to the College for use as a dedicated distance education classroom and development space.

Clark Colborn for assistance with the many facilities issues related to our move to Unit C.

The C&I conference planners who contributed to the success of Engineering short courses and conferences.

Finally, all the Engineering faculty and department heads who worked with us.

As they say at the Oscars, "We couldn't have done it without you!"

**APPENDIX A - C&DE ACTIVITIES IN THE COLLEGE, BY UNIT**

Table A-1. Outreach activities by units of the College of Engineering

Unit	Focus Area, as defined within the Outreach Council		
	Academic	Govt. & Industry	Pre-college & Public
<a href="#">Acoustics</a>	<a href="#">Distance Graduate program</a>	Nonlinear Acoustics Symposium, <a href="#">Summer program in Acoustics, Underwater Acoustics and Signal Processing</a>	
<a href="#">Aerospace Engineering</a>		<a href="#">Rotary wing short courses</a>	
<a href="#">Agricultural &amp; Biological Engineering</a>			<a href="#">Agricultural and Biological Engineering Extension</a>
<a href="#">Architectural Engineering</a>	Distance Lighting courses - inactive, <a href="#">AE Career Fair</a>	<a href="#">Partnership for Achieving Construction Excellence, PACE</a>	<a href="#">American Indian Housing Initiative</a> (has academic elements), <a href="#">Center for Sustainability</a> (has elements in all areas)
<a href="#">Bioengineering</a>	Shared courses with Hershey	2008 Rheology Conference	
<a href="#">Chemical Engineering</a>			<a href="#">2006 AIChE Mid-Atlantic Regional (Student) Conference</a>
<a href="#">Civil &amp; Environmental Engineering</a>		<a href="#">Modern Protective Structures, HEC-RAS for Restoration, HEC-RAS/HEC-GeoRAS</a>	
<a href="#">Computer Science &amp; Engineering</a>	<a href="#">CE at UP courses</a>		
<a href="#">Electrical Engineering</a>	<a href="#">Distance courses - Antenna, EE305</a> course to Hershey	<a href="#">Power Engineering</a> IEEE Device Research Conference June '06	

<a href="#"><u>Engineering Science &amp; Mechanics</u></a>	EMch 13 - in development	<a href="#"><u>Corrosion short course</u></a> <a href="#"><u>2006 SES Conference</u></a> 16th U.S. National Congress on Theoretical and Applied Mechanics - 2010	
<a href="#"><u>Industrial &amp; Manufacturing Engineering</u></a>	<a href="#"><u>Human Factors and Ergonomics, Post-Bacc Certificate</u></a> IE 327 under development	American Foundry Society Cast Metals Institute course	
<a href="#"><u>Mechanical &amp; Nuclear Engineering</u></a>	<a href="#"><u>NucE Distance Graduate program</u></a> <a href="#"><u>Ramp course</u></a> Seminar	<a href="#"><u>Smoke Schools Bearing courses with ABMA</u></a>	<a href="#"><u>Nuc E teacher and K-12 programs, GREATT program with PTI</u></a>
<a href="#"><u>Facilities Engineering Institute</u></a>		<a href="#"><u>Short courses</u></a>	
<a href="#"><u>Pennsylvania Transportation Institute</u></a>		<a href="#"><u>Transportation Conference, international Symposium on Heavy Vehicles</u></a>	<a href="#"><u>GREATT program with MNE</u></a>
<a href="#"><u>SEDAPP</u></a>	<a href="#"><u>Evening courses through CE at UP,</u></a> Other CE courses under development	<a href="#"><u>Leadership courses through CE</u></a>	
<a href="#"><u>Science, Technology, and Society</u></a>	<a href="#"><u>Evening courses through CE at UP,</u></a> Distance courses through World Campus - currently inactive.		
<a href="#"><u>Multicultural Engineering Program</u></a> <a href="#"><u>Women in Engineering Program</u></a>			<a href="#"><u>Visit in Engineering Weekend</u></a> <a href="#"><u>Summer camps,</u></a> <a href="#"><u>Girl Scout Saturdays</u></a>
<a href="#"><u>Nanofab</u></a>	<a href="#"><u>Nanofabrication Manufacturing Technology program</u></a>		<a href="#"><u>K-12 student and teacher programs</u></a>
<a href="#"><u>Center for Sustainability</u></a>			<a href="#"><u>K-12 student and teacher programs;</u></a> <a href="#"><u>public programs</u></a>

<a href="#"><u>Pennsylvania Space Grant Consortium</u></a>			<a href="#"><u>K-12 student and teacher programs; public programs</u></a>
<a href="#"><u>Engineering C&amp;DE</u></a>		<a href="#"><u>Airport Conference, Smoke School, Stormwater Management</u></a>	
<a href="#"><u>COOP</u></a>		<a href="#"><u>Job Fairs</u></a>	