

# **Proposal for Instructional Laptop Computers for COE Faculty**

## **College of Engineering, North Carolina State University**

### **Purpose**

This proposal seeks to improve COE faculty access to up-to-date mobile laptop computing. With 98% of incoming students in possession of a computer—52% of which are laptops—faculty need to be equally equipped with instructional computers to enhance the learning environment and interact with students through technology. Computing is at the base of what engineers do, a primary technology both for the discipline and for education. In the upcoming years, the college will be undertaking a substantial redesign of its computing infrastructure to enhance mobile computing. Getting laptops into the hands of teaching faculty will enable them to lead efforts in engineering computing rather than follow. The college would see faculty and student computing brought closer together, a necessary modernization of our educational facilities, and more and better computing throughout the curriculum. Another important feature of this pilot will be to assess the prospects of establishing a three- or four-year laptop refresh for faculty participants.

### **Needs and Requirements**

The College of Engineering has been running a pilot laptop program in student-owned computing for three years (<http://www.eos.ncsu.edu/soc/>). The pilot has been successful by nearly every standard of measurement except in the area of faculty computing. Some faculty required loaner laptops because they did not have them. Others did not have wireless access that was standard on student computers. More significantly, faculty had no equivalent instruction to what students received in E115 to learn about the tools and technologies available to them, leaving them ill-prepared for the computing questions of their students.

Results from a fall 2003 faculty questionnaire identified the following as additional “barriers facing academic faculty” that prevent them from fully participating in any “implementation of a stated COE policy on student-owned computing”:

- Faculty incentives
- Time, time, time
- Faculty computers compatible with SOC (both hardware and software)
- Training – instructional pedagogy
- Training – hardware and software
- Support of faculty computing
- Resources for all of the above
- Facilities (classrooms and equipment) and scheduling of course sections
- Security issues – physical and virus
- Backup resources

Many faculty have a high demand for mobile access. They need a laptop in class every day to connect to a projector and display software, simulations, designs, and other learning materials they have built on their computers. Many would also like their students to have computers in the

classroom to access online resources or run discipline-specific software. The “classroom” in some cases is a non-traditional setting, e.g., a factory, construction site, hospital, etc.

### **Meeting Requirements**

Providing laptops to faculty offers a way to break down barriers to meet the requirements above:

- **Faculty incentive and time:** Having high-quality computers and software to use is a “shot in the arm” for any faculty member trying to bring computing to bear in education. In the 1980s and 90s, faculty routinely got their computers from research grants, but in recent years, granting agencies have turned this commodity back to the university as institutional overhead. Funding laptops for faculty would help recoup the time they spend seeking resources for instructional computing and offer an attractive incentive.
- **Compatible computing and improved facilities and scheduling:** Laptops can configure any space as a classroom or lab, which is more flexible and economical than building dedicated computer classrooms. Special sections and scheduling are not needed, and faculty and students compute on similar platforms in similar ways.
- **Instruction and support:** COE students have E115 to help them learn to use their laptop computers and interface with college infrastructure and resources. If faculty were offered parallel instruction on their laptops, they would be able to build on the skills students develop in E115 and map technology to pedagogy more effectively.
- **Security and backup:** Many security issues challenge computing, so a major thrust in both faculty and student education will be to learn how to keep computers, data, and personal information secure. Backup services provided on university servers will never meet all the storage needs of users. The laptop’s local and external drives are other repositories to take advantage of.

User education will be the key to the success of mobile computing. Users will need more instruction and assistance rather than hands-on support for their computers. They must also practice secure and safe computing for the protection of themselves and the computing communities they work in.

### **Feasibility and Likelihood of Success**

At the Dean’s Retreat in summer 2003, there was a general consensus among deans, department heads, and directors to broaden our college computing infrastructure to deliver software and services to mobile and “owned” computers, i.e., student-owned computers and university-owned computers belonging to faculty. The three-year pilot program in student-owned computing has given ITECS and the college experience with:

- integrating laptop computers in courses
- working with vendors to license software and specify hardware for laptops
- setting up wireless access in engineering buildings
- preparing E115 instructors to adapt content for students with laptops

At the same time, ITECS and the college have had to develop more services to support the growth in distance education. This development has given us additional experience with:

- delivering services and software by remote access
- improving security for distance access
- developing web applications to replace many command-line tools
- documenting services for the distance user coming in from a variety of platforms

This acquired experience with technologies that support laptop, mobile, and distance computing suggest that the time is right to initiate a college-wide effort. Continuing the student-owned computing pilot with a parallel focus on faculty computing will keep the program in balance and improve the likelihood of its long-term success.

**Implementation**

Students in the pilot laptop program take courses across the curriculum: English, Math, Economics, Graphic Communication, Computer Science, Foreign Languages, and Engineering 101 and 115. In fall 2004, the college will have 578 students in the laptop program, 300 as entering freshmen and 278 in advanced courses. Many other students have bought computers off the vendor plan and take advantage of SOC resources. Pilot students have been taught in special sections of E115 on their laptops since the pilot’s beginning in 2001, either Windows or Linux. This fall, they can also choose Macs. While multi-platform in scope, the pilot makes strong recommendations about running current versions of operating systems (see table below).

<i><b>SOC Pilot Laptop Computers and Operating Systems (taught in E115)</b></i>				
	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>
<b>Windows</b>	<b>Win2000</b>	<b>XP Pro -----&gt;</b>		
<b>Red Hat Linux</b>	<b>7.1</b>	<b>7.3</b>	<b>9</b>	<b>Fedora</b>
<b>Macintosh</b>				<b>OS X</b>
Total Laptops Each Year	33	45	200	300
Cumulative Totals in SOC Program	33	78	278	578

If faculty were able to participate in the same plan available to students, they would be better prepared for the students they get in their classes who have gone through the program or benefited from its resources. We propose to:

- acquire laptop computers for 40 faculty, who will work to integrate mobile computing in engineering courses, principally in the major.
- provide these faculty with a software stipend for essential applications.
- provide portable projectors to support classes.

- partner with these faculty to set direction for educational computing in the college. With planning under way for Eos 2, ITECS and the COE administration need to work closely with faculty to create an organized approach to mobile computing in our environment.
- test the delivery and use of discipline-specific software in the SOC setting, along with other applications needed by instructors in their classes.
- provide workshops to faculty to help them configure their laptops, work wirelessly, interface with our environment, and practice secure/safe computing. Workshop sessions will also provide an opportunity for faculty to share methods, tools, and strategies with each other and to identify to the technical staff their instructional support needs.

We anticipate a cost of \$2,250 per machine and another \$250 in software per faculty member. Support and instruction come from existing IT and Help Desk staff in the college. Faculty can use the same procedures for ordering and receiving their equipment that students use at <http://www.eos.ncsu.edu/soc/purchasing.php>. If the program can be funded this spring, equipment purchases and faculty workshops can take place before the end of the fiscal year. The faculty can then begin teaching with their computers in fall 2004.

Attendance at the workshops would be required of faculty to receive their laptops. This follows the model used at Virginia Tech for their 10-year program of providing computers to faculty. The faculty valued the instruction they received, which elevated faculty skill across the program, reduced support demands, and improved communication between faculty and IT staff.

Each department will be allocated a number of laptops, which go on the department inventory. Faculty can choose a laptop computer from the plan with the money allocated. To “option up” in either hardware or software, they will need to pay the difference from department funds. The computers belong to these faculty members until they give them up. When that happens, the department decides how to use or dispose of them.

### **Responsibility of the Department and Selection Criteria**

The departments will choose the 40 faculty for the program. Laptops will be allocated per department based on its number of tenured and tenure-track faculty. In the case of a small allocation of one or two computers, the department head and Computer Committee representative might select the person or people. With larger numbers, they could organize a selection panel. The faculty selected for the pilot should:

- be teaching faculty with instructional responsibilities in the 2004-05 academic year, and also engaged in efforts to integrate computing in instruction.
- provide a description of how the laptop would be used to enhance instruction in the courses taught.
- commit to attending the workshops provided by the college on laptop use, networking, available resources, technical support, software, and secure/safe computing.
- assess the outcome of the project at the end of the semester and report on how the stipend was spent.

Not all students have laptops to bring to class, so faculty cannot organize their proposal around that assumption. The focus has to be on ways the faculty member can make use of the instructional computer to enhance teaching and learning. Suggested ways to use the laptop:

- show students how to use discipline-specific engineering software that they have access to in Eos and/or department labs.
- use it in conjunction with laptop carts available from ITECS for classroom computing, see <http://www.eos.ncsu.edu/soc/faculty.php> (application deadline March 24).
- enrich the class with simulations, animations, and other instructional content that can clarify or demonstrate concepts and techniques.

In some departments, classrooms are without projectors, and portable projectors are in short supply. It is allowable on this grant for a department to substitute a projector for one laptop purchase in order to enhance the delivery of all the courses participating.

Some departments have already made a sizable investment in laptops for faculty. This grant is a way to augment that investment and make additional purchases possible. Faculty who already have laptops that meet the required specification are invited to join the workshops and take advantage of the software resources available to the faculty on the grant.

Assessment of these classes will be coordinated by Joni Spurlin, Director of Assessment in the college. It is important to demonstrate the educational gains made with these resources. We hope to show that more and better computing in the classroom, directed by faculty adequately equipped to make use of it, will encourage further investment and support. Faculty will keep the program tuned to department mission and ensure that it is improving engineering education for students. The greater the participation by faculty, the greater our prospects of establishing a three- or four-year laptop refresh for faculty participants.

## **Conclusion**

Mobile computing is not the only computing direction for the college. It is just the newest one and needs resources to jumpstart it and bring it into the mainstream. Lab computing, high-performance computing, research computing, distance computing, etc., are all important to the college. Their development and improvement are part of the next-generation Eos planning under way in the Computer Committee.

Industry projections suggest that laptop purchases will continue to rise and will eventually replace the desktop as the computer of choice. Like the slide rule and calculator before it, the laptop may not need to be explicitly required of students. The Computing Committee has already determined that a single mandated platform OS is likely to be resisted and is undesirable. What is more promising is to evolve our college infrastructure to make it possible for faculty and students to use a range of platforms and OSes to get to the tools and services they need.

Resources are well placed if they foster innovation and faculty accomplishment in their fields of instruction. This proposal is a stimulus package to engage COE faculty in modern instructional computing and produce an across-the-board improvement in their proficiency and support.