

UT College of Natural Sciences Information Technology Vision Plan

2002-2003

Introduction

The College of Natural Sciences is dedicated to using information technology to enrich the educational experience both of our majors and of the thousands of students throughout the university who take our courses.

We believe information technology should impact our students in the lecture halls, in our science labs, and in their dorm rooms. To this end, we must provide state-of-the-art networks, instructional computer labs, powerful server machines, and technology rich classrooms and laboratories. We must have a professional staff to support and maintain these facilities, and we must be constantly upgrading our hardware and software to keep it current. And, most importantly, we must give our faculty the support they need to revise and enhance their courses to take advantage of information technology.

Overview

This vision plan conforms to the suggested format. We begin with a list of specific funding requests. These requests are supported and justified by the college's goals described in Appendices A through D.

We continue with a summary of major projects funded during the last year and being funded this spring. We then describe how our ITAC allocation complements our other sources of funding and how our expenditures benefit the university as a whole.

Appendices A through D describe our vision and accomplishments in the areas of networking, computer labs, technology classrooms, and curriculum innovation.

Specific ITAC Funding Requests for 2002-2003

Technology Auditoriums and Classrooms

\$ 595,000

We plan to modernize five large auditoriums (TAY 2.006, PAI 2.48 and 4.42, plus two auditoriums in the new GEO building addition scheduled to open in Spring 2003) and six smaller auditoriums / classrooms (WEL 2.304, 2.308, 2.312, and 2.256, ESB 222 and 333). These are all general purpose classrooms used by faculty throughout the university. These modernizations will add 1,195 seats to the current inventory of technology rooms. The College of Natural Sciences uses local funds to pay for the staff who assemble and install the equipment and for the maintenance of our existing technology rooms.

Instructional Computer Labs

\$ 350,000

We will replace about 200 computers in our existing instructional computer labs and science labs. This includes 120 computers in our joint-use labs. (See Appendix B.) We expect to pay about \$1,500 for each new system. This money will also fund printers and scanners for computer labs and high-end computers for multimedia labs.

Faculty Curriculum Development Projects

\$ 200,000

As in the past, we plan to fund faculty projects to integrate information technology into their classes and to take advantage of the computing facilities in our college. These projects will include the development of web sites for classes, the design of multimedia presentations for classes, and the use of information from the World Wide Web in lectures. A significant amount of this money will support the web-based Homework Service in the departments of Physics, Mathematics, and Chemistry (see Appendix D).

Networking and Associated Electronics

\$ 200,000

The modernization of the data network in RLM will begin in Summer 2002 and continue through Spring 2003 (see Appendix A). The College of Natural Sciences will use local funds for half of the \$400,000 cost. Funding for wireless networking is also needed.

Servers, Storage, and Backup

\$ 60,000

In addition to the computers in our general purpose labs, we contribute to the cost of departmental servers that host student web pages and files, store class related information, and move email between students and faculty. This funding also provides for the servers for our instructional computer labs.

Portable Multimedia Equipment

\$ 36,000

We expect to fund six light-weight LCD projectors and notebook computers for checkout by faculty teaching in rooms (mainly in other colleges) that have not yet been modernized.

TOTAL REQUEST

\$ 1,441,000

Summary of Recent Expenditures

It is beyond the scope of this report to detail every student fee funded IT expenditure in the College of Natural Sciences. We have chosen to focus on a few of the largest expenditures having the greatest impact.

Technology Classrooms

During Summer 2001 we completed seven new technology classrooms, including four dual projection auditoriums. Six of these rooms are general purpose classrooms. Total cost: \$410,000. We are investing \$5,000 in a new wireless classroom system that allows students to provide feedback to their instructor during class. Students can be asked to work problems or answer questions during class and the instructor can immediately view the results.

Computer Labs

In Fall 2001, we allocated \$30,000 to set up a Network Instructional Lab in the Computer Science Department that will house \$100,000 of equipment donated by Cisco. This Spring we are establishing a new graduate computer lab in the Seay building (estimated cost: \$25,000) and a new computer classroom in GEA (estimated cost: \$55,000). We are replacing all the computers in the Chemistry multimedia lab (estimated cost: \$30,000). We have installed new LCD projectors in the Welch computer lab/classroom (total cost: \$14,000). Three year old computers in all labs are routinely being replaced.

Curriculum Innovation

During 2001-2002 we contributed \$120,000 to the Interactive Homework Service project in Physics, Mathematics, and Chemistry. See Appendix D for details. We also funded the development of a digital petrographic tutorial for use by students in Geological Sciences (total cost: \$28,000).

Networking

During Summer 2001 we totally replaced the network electronics in GEA and GEO (total cost: \$101,000). During 2001 we cabled the new Computer Science Elements Lab in PAI and all the classrooms in GEA (final costs not yet known). During Summer 2001 we installed wireless networking in the areas of RLM and WEL in which students congregate (total cost: \$5,000). During Spring 2002 we are totally replacing the network electronics in BIO and PAI (total cost: \$137,000).

Infrastructure & Services Supported by Local / Special Funds

The College of Natural Sciences has its own IT fee, which complements but does not replace the need for the ITAC funding received by the college. Our College IT Fee money is almost completely tied up in salaries and wages. Here are some examples of how the two sources of funding are used together:

- ITAC funds are used for the one-time purchase of equipment in our technology classrooms. College IT Fee money is used to pay the salaries of the staff who assemble, install, and troubleshoot the equipment and the students who test the equipment each morning. College IT Fee money also pays for expendables, such as projector bulbs and cordless microphone batteries.
- ITAC funds are used to purchase the computers in our instructional computer labs and the software that runs on them. College IT Fee money is used to pay the lab proctors who assist students using the labs and the staff who install and maintain the computers. College IT Fee money also pays for expendables, such as paper and toner for printers.
- ITAC funds and College IT Fee money are used together to fund the purchase of network electronics and cable installations. College IT Fee money is used to pay the staff who install, maintain, and troubleshoot our network.
- ITAC funds are used to pay for servers that host student web pages, provide students with storage space, and serve as image machines for our labs. College IT Fee money is used to pay the staff who maintain the servers and who assist students and faculty with the development of web pages.

Collaborative Activities

The College of Natural Sciences shares its experience and facilities with groups around campus.

- Our technology classrooms serve the entire university. Students from every major take classes in our rooms. Our technology auditoriums are in high demand across campus for distinguished speakers, student organization activities, and special university functions and events.
- Our Technology Classroom Team, under the direction of Kurt Bartelmehs, assists every college in designing and implementing technology classrooms. Our space in the ACES building is where the consoles for virtually every new technology room on campus are assembled. Our designs and equipment lists are made available to everyone.
- Two of our instructional computer labs are joint use labs, open to every student at UT. Other labs, such as the Physics Microcomputer Lab, are now opening their doors to all students.
- We enjoy a close working relationship with William Green's network group and contribute to special equipment purchases for the NOC whenever asked.

Appendix A - Building Network Status

Our Goal

The College of Natural Sciences supports and works toward complying with the university's standard for networking. Specifically, 1) each building should have as few telecom closets as possible, 2) all network electronics should reside in secure closets and be professionally managed, 3) all wiring should be at least cat 5 "home runs" between the desktop and the nearest telecom closet, 4) electronics should provide at least switched 10/100 service to the desktop with gigabit uplinks, and 5) each building should have redundant fiber to the NOC.

Our Status

Our largest building, RLM, needs totally new network electronics to bring it up to standards. We have scheduled this for Summer 2002 through Spring 2003 and estimate its cost to be at least \$400,000. Because a total renovation of ESB may occur as soon as three years from now, we have exempted this building from complying with the standards. The following is a summary of the network electronics currently in our buildings:

| | | |
|------|----------------------|--|
| WEL | all switched 10/100 | modernized Fall 1999 |
| WCH | all switched 10/100 | modernized Spring 2000 |
| PAT | all switched 10/100 | modernized Summer 2000 |
| MBB | all switched 10/100 | modernized Summer 2000 |
| ESB | at least switched 10 | postponed until building renovation |
| MSI | various technologies | modernization in progress - awaiting recabling |
| TAY | all switched 10/100 | modernized Spring 2001 |
| GEO | all switched 10/100 | modernized Spring 2001 |
| GEA | all switched 10/100 | modernized Spring 2001 |
| PAI | all switched 10/100 | modernized Spring 2002 |
| BIO | all switched 10/100 | modernized Spring 2002 |
| SEAY | all switched 10/100 | building opens Spring 2002 |
| RLM | various technologies | scheduled for modernization in 2002-2003 |

Wireless Networking

We currently have three buildings with wireless networking: TAY (entire building), WEL (1st and 2nd floors only), and RLM (4th, 5th, and 6th floors only). We plan to expand wireless networking into other areas where laptops are heavily used and into science labs that require the flexibility of wireless networking.

Network Growth

We continually pull additional cables and buy additional switches to meet the growing networking needs of computer labs, research and teaching labs, building renovations, *etc.* We currently have 244 switches with a total of 8168 ports, 6775 of which are active.

Appendix B - Computer Lab Status

Our Goal

While the number of students owning their own computers continues to rise, students still rely on us to provide them with specialized software and hardware which they cannot afford. Our goal is to maintain our existing instructional computers labs in every department by replacing hardware every three to four years and upgrading software every one to two years. We will aggressively work to incorporate more computers into science labs where they greatly enhance what students learn from conducting experiments. We will create additional computer classrooms based on faculty needs.

Our Status

The College of Natural Sciences currently has about 30 ITAC funded instructional computer labs containing more than 600 computers. These labs include large undergraduate labs, smaller graduate student labs, course specific labs, and specialized multimedia labs. Our joint use labs are open to all students at UT. The following is a list of our largest labs, with the number of computers in each.

| | | | |
|-----------------|------------------|--------------------------------|----|
| WEL 2.306/2.302 | Chemistry | Joint use lab | 63 |
| ESB 101/103 | Bio Sciences | Joint use lab | 59 |
| RLM 7.308 | Physics | Physics Microcomputer Lab | 50 |
| RLM 8.136/8.118 | Mathematics | Undergrad/grad lab | 41 |
| GEA 27/29 | Human Ecology | Undergrad lab | 38 |
| PAI 3.22 | Computer Science | Lower division undergrad - PC | 35 |
| WEL 2.200 | Chemistry | CH 204 computer lab | 25 |
| TAY basement | Computer Science | Graphics lab | 23 |
| PAI 3.12 | Computer Science | Lower division undergrad - Mac | 20 |
| RLM 13.116 | Astronomy | undergrad non-major lab | 20 |
| PAI 1.32 | Bio Sciences | undergrad lab | 20 |

Five of our computer labs also serve as computer classrooms where faculty can lecture and project images while students work at computers. At least eight of our science labs are equipped with computers for real-time data acquisition and analysis.

Future Demand

We expect the size and number of instructional computer labs to remain fairly constant, with a continuing shift away from Macs toward PCs. We see a small need for additional computer classrooms and a significant need for more computers in science labs. We see an increasing need for specialized peripherals - including color printers, large format printers, and high resolution scanners - and for specialized software used in our courses.

Appendix C - Classroom Technology Status

Our Goal

Our goal is to put standardized teaching technology into every classroom and auditorium in our college that seats 50 or more students. We also plan to put standardized technology into a variety of classrooms having seating capacities less than 50 and to see that faculty needing technology in small classes receive scheduling priority in those rooms. We will continue to provide advice and assistance to other colleges who wish to adopt our standardized design for use in their classrooms.

Our Status

We currently have 18 technology rooms with a total seating capacity of 3,164. All but three of these rooms are general purpose university classrooms. Large auditoriums cost \$80K each, while smaller classrooms cost \$35K each. The following list shows our current rooms, their seating capacity, and the department having scheduling priority.

| | | |
|-------------------------|--------|------------------------------------|
| GEO 100 | 291 | Geo Sciences |
| PAI 3.02 | 216 | Bio Sciences |
| WEL 2.224 | 488 | Chemistry & Biochemistry |
| TAY 2.106 | 168 | Computer Sciences |
| WEL 3.502 | 216 | Astronomy |
| GEA 105 | 173 | Human Ecology |
| RLM 5.104, 6.104, 7.104 | 3 x 84 | Math / Physics / Astronomy |
| WCH 1.108 | 40 | Dean's Scholars / Natural Sciences |
| WEL 2.122 | 120 | Chemistry & Biochemistry |
| RLM 4.102 | 144 | Math / Physics / Astronomy |
| WEL 1.316 | 255 | shared by all |
| WEL 1.308 | 333 | Chemistry / Biochemistry |
| WEL 2.246 | 179 | shared by all |
| ESB 115 | 144 | Biological Sciences |
| RLM 15.216 | 65 | Astronomy |
| GEO 112 | 80 | shared by all |

Future Demand

One might think that these rooms should be meeting the needs of our faculty quite nicely, but just the opposite is true. Once faculty convert their teaching materials to use technology, they cannot teach in an old-fashioned room. The demand for technology classrooms is greater now than ever before.

Portable Equipment

We furnish each department with portable LCD projectors and laptop computers for checkout and use in rooms that have yet to be modernized. Large departments require 4 or 5 sets of equipment to meet faculty needs.

Appendix D - Curriculum Innovation Status

Our Goal

Our goal is to provide chosen faculty with a modest level of funding to encourage and enable them to incorporate information technology into their classes. We choose not to use student fee money to allow faculty to “buy out” of teaching. Nor do we fund personal computers for faculty offices. The most commonly funded requests are for part-time students to assist faculty in curriculum development and for specialized software or hardware.

The Homework Service Project

One curriculum development project in our college is having a tremendous impact on the quality of education at UT and therefore receives substantial funding. The Interactive Homework Service project was begun by Prof. Fred Moore in Physics and has been recently adopted by both our Mathematics and Chemistry & Biochemistry departments.

This project is making thousands of homework and practice problems, together with their solutions and explanations, available to students on the web. Because the system can use random numbers in creating problems, there is an infinite collection of problems that can be generated. The system can grade the student’s answers and can provide explanations for problems with which the student had difficulty.

The goal of this system is not to reduce human interaction, but to actually increase it. TAs who once spent hours every week grading papers now have time to meet with students to give individual help and to explain difficult concepts.

While we fund only the parts of this project that directly impact UT students, the interactive homework service is being used by high schools and colleges around the world. A student taking a physics course in another country may use the homework service and benefit from work done at UT. Faculty at other schools critique existing problems and submit new ones - to the benefit of our students.