# UT College of Natural Sciences
# Information Technology Vision Plan

**2004-2005**

*As requested, this vision plan is an update to our 2003-2004 vision plan. The organization is identical and most of the verbiage remains the same. We have updated quantities, room numbers, dollar amounts, etc. to reflect our progress over the last year and our plans for the coming year.*

## 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 empower our students wherever they are learning: in the classroom, in the laboratory, and in the field. To this end, we must provide wired and wireless networking, instructional computer labs, technology rich classrooms and laboratories, and portable equipment for check-out by faculty and students. We must have a professional staff to support and maintain our 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 is in the same format as last year. 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 2004-2005

**Technology Classrooms and Auditoriums** $ 450,000

We plan to modernize 15 classrooms that seat 30-50 students each: RLM 5.118, 5.120, 5.122, 5.124, 6.118, 6.120, 6.122, 6.124, 7.118, 7.120, 7.122, 7.124, 12.166, ESB 137, GEA 107. Thirteen of these fifteen rooms are general purpose classrooms used by faculty and students throughout the university. These modernizations will add 612 seats to our current inventory of technology rooms. The College of Natural Sciences will use local funds to pay the staff who assemble, install, and maintain this equipment. $50,000 of our request is for equipment upgrades in our existing technology classrooms.

**Instructional Computer Labs and Science Labs** $ 300,000

We plan to expand the number of computers in our science labs and to replace aging computers in our instructional computer labs (150 computers x $1,500). We plan to build a 16-seat computer-equipped science lab at Brackenridge Field Laboratory for field courses taught by Biological Sciences.

**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 funding will support the use of CPS, a student response system that we have in more than a dozen of our auditoriums.

**Networking and Associated Electronics** $ 250,000

We are undertaking a project to provide standardized 802.11g wireless networking throughout our colleges. Students will be able to access the Internet from their laptops whether they are in libraries, classrooms, science labs, hallways, or offices. RLM and Welch will be the first buildings to be equipped. A portion of this request will also fund a new switches and cable pulls to keep up with the growing demands being placed on our network.

**Servers, Storage, and Backup** $ 75,000

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** $ 25,000

There is a huge demand for portable LCD projectors and notebook computers for checkout by faculty and graduate students using smaller classrooms and conference rooms around the university that have yet to be modernized. We will replace aging equipment and increase the number of available units.

TOTAL REQUEST $ 1,300,000

## 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 larger expenditures having the greatest impact.

### Technology Classrooms

During Summer 2003, we completed ten new technology classrooms having a total of 420 seats. Eight of these ten rooms are general purpose university classrooms.

We now have 12 auditoriums that support a wireless student response system, called CPS, which 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

During 2003, more than 300 computers were purchased and deployed in instructional computer labs throughout the College of Natural Sciences. All these computers were equipped with flat panel monitors, CD burners, a gigabyte of memory, and USB ports for memory keys. We continue to offer both Dell PCs and Apple iMacs in proportion to their usage by our students. Important software was also upgraded on all of these computers.

### Networking

During Summer 2003, we made major upgrades to the data network that interconnects our computers and allows us to communicate with the outside world. The College of Natural Sciences has the first three buildings on campus (TAY, WEL, and RLM) that are connected by 10 gigabit per second fiber network links. In future years, these links will allow students to view live and recorded lectures wherever they are in the college.

### Excellence in Large Classroom Teaching

Large auditorium classes with hundreds of students have always posed unique challenges to faculty. In a large, impersonal auditorium environment, it is difficult for teachers to know if they are successfully communicating with their students. The College of Natural Sciences was the first college to offer the CPS student response system in our auditoriums, and we now have 12 auditoriums equipped with this technology. Using CPS, faculty can pose questions to their students during lecture. Students respond using a hand-held battery-operated response unit. The instantaneous feedback allows the faculty member to discover what their students do and don't understand about a topic and to adjust their lectures in real time to improve learning.

## Infrastructure & Services Supported by Local / Special Funds

The College of Natural Sciences has it 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 maintain the equipment and of 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 equipment purchases for the NOC that benefit the entire university.

# 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 the minimum required number of telecom closets, 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

With the exception of ESB and Port Aransas (Marine Sciences), our network is both modern and standardized. 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 |
| 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 | all switched 10/100 | modernized | January | 2003 |
| ESB | various technologies | scheduled for modernization in | | 2003/2004 |
| MSI Port Aransas | various technologies | awaiting recabling | | |

## Wireless Networking

We currently have several buildings with some wireless networking: TAY (entire building), WEL (classroom and library areas), RLM (4th, 5th, and 6th floor classrooms area), GEO (select areas), PAI (CS space). 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 more than 250 switches with more than 8000 ports.

Appendix B - Computer Lab Status

## Our Goal

While the number of students owning their own computers continues to rise, students still rely on our instructional computer labs both for convenience and for specialized software and hardware. Our goal is to maintain our existing instructional computers labs in every department by replacing hardware every four years and upgrading software every two years. We will aggressively work to incorporate more computers into science labs where they greatly enhance how much students learn from conducting scientific experiments. We will create additional computer classrooms in which every student has a computer at their desk.

## 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 instructional 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. More than a dozen 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 growing need for 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 and to maintain these rooms to the highest standards. We have already surpassed our initial goal of having standardized technology in every classroom with 50 or more seats. 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 41 technology rooms with a total seating capacity of 4,443. 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.

| | | |
|---|---|---|
| WEL 2.224 | 488 | Chemistry & Biochemistry |
| WEL 1.308 | 333 | Chemistry & Biochemistry |
| WCH 1.120 | 329 | shared with Liberal Arts |
| GEO 2.324 | 291 | Geo Sciences |
| WEL 1.316 | 255 | shared by all |
| WEL 3.502 | 216 | Astronomy |
| PAI 3.02 | 216 | Bio Sciences |
| WEL 2.246 | 179 | shared by all |
| GEA 105 | 173 | Human Ecology |
| TAY 2.106 | 168 | Computer Sciences (departmental) |
| TAY 2.006 | 150 | shared by all |
| RLM 4.102 | 144 | Math / Physics / Astronomy |
| ESB 115 | 144 | Biological Sciences |
| PAI 4.42 | 138 | Physics |
| PAI 2.48 | 138 | Physics |
| ESB 333 | 120 | shared by all |
| WEL 2.122 | 120 | Chemistry & Biochemistry |
| GEO 2.216 | 117 | shared by all |
| WEL 2.312 | 98 | shared by all |
| WEL 2.308 | 98 | shared by all |
| ESB 223 | 95 | shared by all |
| GEO 2.218 | 93 | shared by all |
| WEL 2.304 | 92 | shared by all |
| RLM 5.104, 6.104, 7.104 | 3 x 84 | Math / Physics / Astronomy |
| GEO 2.102 | 80 | shared by all |
| RLM 15.216 | 65 | Astronomy (departmental) |

| | | |
|---|---|---|
| PAI 3.14 | 62 | Computer Sciences (departmental) |
| WEL 2.256 | 56 | shared by all |
| GEO 3.222 | 45 | Geo Sciences |
| RLM 5.116, 6.116, 7.116 | 3 x 41 | shared by all |
| WCH 1.108/1.110 | 40 | Dean's Scholars / Natural Sciences |
| GEA 100 | 40 | Human Ecology |
| GEA 114 | 40 | shared by all |
| GEO 2.202 | 39 | Geo Sciences |
| WEL 3.402 | 36 | shared by all |
| BIO 301 | 35 | 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 by faculty teaching in rooms that have yet to be modernized. A large school like the School of Biological Sciences may need a dozen 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 do not 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.