Purpose: To make recommendations to the Dean for the use of student technology fee money, and to discuss and recommend technology strategies for the School of Science

The technology committee has met four times so far this academic year (9/26/08, 10/24/08, 12/5/08, 2/18/09). During these meetings, the committee has made several key decisions:

1. In recognition of the campus decision to charge graduate students a technology fee, the committee proposed an amendment to the SoS Faculty bylaws adding graduate student representation to the committee.
2. That amendment was presented to the faculty during the Fall assembly (11/7/08). During discussion, an additional amendment was proposed to the description of the committee’s mission. (note: both amendments were subsequently carried by a mail ballot of the faculty. The amended text is attached as appendix I)
3. The committee considered and passed a budget for the use of student technology funds (STF) for the 2008-09 fiscal year. The approximate budget is $715K, but the final figure is determined by enrollment through Summer I 2009. A summary of the budget is attached as appendix II.
4. The committee made a recommendation to Dean Ng regarding the creation of a new accounting mechanism intended to ensure that technology funds are not intermingled unnecessarily with funds generated by lab fees. This recommendation was sent to Dean Ng on 2/18/09, and is attached as appendix III
5. During an “emergency meeting” on 2/18/09 the committee discussed what was, at the time, a proposal put forth by IU VP for IT
Brad Wheeler. The proposal called for all student technology funds at IUPUI to be administered by UITS rather than having a portion administered by the schools. The committee composed a letter to Dean Ng describing the committee’s response to the proposal. This letter is attached as Appendix IV. (Note: subsequently, Chancellor Bantz has communicated his intention to adopt the UITS plan in a memo to the Dean’s Council).
Appendix I: Amended bylaws description of the Technology Committee

The Technology Committee

Membership. Voting members of the committee shall consist of the Dean, or the Dean’s Designee, two undergraduate students, one graduate student and one representative from each Department in the School of Science. Department representatives may be selected from members of the VOTING FACULTY or the NONVOTING Faculty. A second Dean’s designee may also be a nonvoting member of the committee. The committee shall be chaired by the Dean or Dean’s first designee.

Duties and Responsibilities. This committee shall:

1. be a forum for the discussion of the use of technology in teaching, research, and service,

2. advise the administration on school-wide policies regarding the use of technology in teaching, research, and service,

3. advise the administration on the trends and uses of technology in teaching, research, and service,

4. establish and review annually a technology plan for the School of Science, and

5. advise the administration on the expenditure of technology funds.
## School of Science Student Tech Fee Budget - 2008-2009
12/5/09

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Student Tech Fee Allocation (Estimate)</td>
<td>$715,000</td>
</tr>
<tr>
<td>B. Carryover from Prior Year</td>
<td>0</td>
</tr>
<tr>
<td><strong>C. Total Spendable Allocation (A+B)</strong></td>
<td>$715,000</td>
</tr>
<tr>
<td>D. Department Budgets</td>
<td>$80,000</td>
</tr>
<tr>
<td>Per Department =</td>
<td>$11,429</td>
</tr>
<tr>
<td>E. General Maintenance School Items</td>
<td>$9,000</td>
</tr>
<tr>
<td>F. Tech Support Salaries and Benefits</td>
<td>$265,958</td>
</tr>
<tr>
<td>G. Software licenses</td>
<td>$24,506</td>
</tr>
<tr>
<td>H. SL 070, LD225 Computer clusters and testing center</td>
<td>$185,964</td>
</tr>
<tr>
<td>I. Lifecycle costs (outside SL070, LD225)</td>
<td>$29,852</td>
</tr>
<tr>
<td><strong>J. Total Preapproved Items (sum D-I)</strong></td>
<td>$595,279</td>
</tr>
<tr>
<td>K. Amount held until Spring 2008</td>
<td>$36,000</td>
</tr>
<tr>
<td><strong>L. Amount initially available for allocation (C-J-K)</strong></td>
<td>$83,721</td>
</tr>
<tr>
<td>M. Funded Proposals (round 1)</td>
<td>$68,667</td>
</tr>
<tr>
<td><strong>N. Amount available for Spring Allocation (K+L-M)</strong></td>
<td>$51,054</td>
</tr>
<tr>
<td><strong>O. Spring Allocations</strong></td>
<td>$34,994</td>
</tr>
</tbody>
</table>

**Fall Summary**

| C. Total Spendable Allocation (A+B)                                        | $715,000     |
Appendix II: 2008-09 STF Budget

P. Projects total (M+O) $103,661
J. Fixed Cost Total $595,279
Q. Total Expenditures $698,940
R. Fund Balance $16,060
Appendix III: Letter #1 to Dean Ng regarding Lab fees

Bart -

I am writing to send you the attached letter, as well as to publicly apologize to the technology committee for not sending it to you sooner. I thought I had, but I cannot find a record of having done so.

The letter came up during the conversation at today's meeting, so I was reminded of it.

You may have seen an early draft anyway, as you are included on TechComm mailings, and it was sent around in draft form.

Attachment text follows

Acting Dean Bart S. Ng
IUPUI School of Science, LD222
402 N. Blackford St.
Indianapolis, IN 46202

Dear Dean Ng,

The mission of the Technology Committee is, in part, to “advise the administration on the expenditure of technology funds.” In accordance with this mission, we recommend that the School’s fiscal officer create and maintain separate accounts to record the income, expenditures and assets of each department and program based on laboratory fees. We discuss the (undesirable) connection between laboratory fees and technology fees below.

We believe that separate laboratory fee accounts are necessary in light of recent changes in the way the School collects and uses laboratory fees and technology fees to support our educational mission. Specifically, the School has recently increased the laboratory fees in order that those fees will support the ongoing laboratory teaching efforts of the departments and programs. This should eliminate the need to divert technology funds to this purpose, as has been a common practice. This change allows the technology fee to support student technology in the ways that it is used in other schools, e.g., to support student technology centers, computer-based testing, technology staff, new uses of educational technology, etc.

We support this change, but are concerned that this creates a burden on departments, which must now save laboratory funds over long periods to support the replacement of capital equipment. In order to facilitate budgeting of laboratory fees over periods which may span the tenure of several chairs, we believe the laboratory fees should be held in separate accounts clearly established for this purpose. We fear that if these accounts are not established, the technology fee will again be tapped to replace equipment needed for ongoing laboratory operations. This would reduce the
Appendix III: Letter #1 to Dean Ng regarding Lab fees

The school’s ability to invest in educational technology that transcends the needs of specific lab courses. Further, maintaining accounts for this purpose will make it clear that these funds do not represent a surplus that could be held against the school in future budget discussions.

In summary, we believe that separate laboratory fee accounts will benefit the school in several ways, including safeguarding the technology fee against use to support ongoing lab courses. A purpose for which it was never intended.

Sincerely yours,

The School of Science Technology Committee
Appendix IV: Letter to Dean Ng regarding UITS proposal

Dean Ng -

I have attached a document that represents the collected insight of the faculty, students, and staff who comprise the School of Science Technology Committee on the subject of the recent UITS proposal to redirect STF funds at IUPUI.

The document is the result of our discussions at the meeting of 2/18/09, plus additional discussions carried out electronically. We have attempted both to convey our collective opinion of the UITS proposal, and to provide information that you may find relevant in composing a reply to this proposal on behalf of the school. Representatives of the student body and all departments contributed (with the exception of Earth Sciences, whose representatives are out of town, indeed, out of the hemisphere). If you desire further information, please contact us collectively or as individuals.

Regards,

Andy Gavrin,
Chair, School of Science Technology Committee

Attachment text follows

Acting Dean Bart S. Ng
IUPUI School of Science, LD222
402 N. Blackford St.
Indianapolis, IN 46202

Dear Dean Ng,

The mission of the Technology Committee is, in part, to “advise the administration on the expenditure of technology funds.” In accordance with this mission, we discussed the UITS proposal that you outlined for us at our meeting on 2/18/09. In brief, the proposal envisions ending the system by which a portion of student technology fee (STF) income is redistributed to the responsibility centers at IUPUI in proportion to credit hours. As you requested we considered the proposal in the light of providing the best possible service to students in the School of Science. It should be noted that the committee includes two undergraduate student representatives who are voting members, and that both of these students were present for the meeting. We discussed the proposal overall, in particular the potential benefits of centralizing technology services, purchasing, and other decisions. We also discussed the ways in which the expenditure of STF income may complement the expenditure of funds obtained from lab fees to support instruction in our lab courses.

Overall, the response to the proposal was strongly negative, though some positive aspects were noted and appreciated. The committee felt that most STF funds could be more effectively tar-
Appendix IV: Letter to Dean Ng regarding UITS proposal

targeted to student needs if they are discussed, administered and expended locally. The educational needs of undergraduates in science on an urban campus are far different from those of professional and graduate students, fine arts students on a residential campus, education students on a regional campus, or students pursuing an online degree from afar. In such a diversity of situations, students’ educational needs can best be determined by the faculty and staff who provide the education, in close consultation with representatives of the local student body. The committee recognized that some central expenditures may be highly effective and efficient, the provision of network infrastructure, e-mail and other services, and licensing of widely used software are clear examples. However, the overriding concern was that centralization would focus the use of STF funds on “mass consumption” needs, rather than on the particular needs of students in science classes. In light of these considerations, the committee felt that the current STF distribution model is appropriate. In this mode, approximately 60% of STF funds collected at IUPUI are administered by UITS, and 40% are administered by the schools in proportion to full time equivalent enrollment.

In the remainder of this letter, we detail the committee’s discussions, and provide specific recommendations for a response to the UITS proposal. A list of technology-based resources available to students taking classes in the School of Science is attached as Appendix I

Student Technology Centers
We began by discussing the Student Technology Centers (STCs), as the UITS document you provided focused largely on these facilities. The committee agreed that STCs may be run effectively and efficiently by UITS.

The committee agreed, based largely on student input, that the creation of an STC in the Campus Center should be a high priority. This decision was based on a desire to extend the “reach” of the STCs further to the west on our campus, and on the large numbers of students who congregate in the Campus Center. Students also noted that the computers in the library were usually sufficient, but that at peak periods it could be difficult to find an open machine. The need for an STC in Taylor Hall (home of University College), was far less compelling. The students noted that Taylor Hall does not include significant classroom space, nor does it offer food service. Thus, students are less inclined to “hang out” in that building. The committee agreed that new or expanded access to STCs was an important goal, but that the numbers, sizes, locations, and hours of operation of the STCs should be based on a needs assessment, and that such an assessment should precede a significant change in the formula for distributing the technology funds.

The committee also noted that the facilities provided in the STCs must continue to evolve as students’ needs and work habits change. Students are increasingly carrying laptop computers and other mobile devices. The committee felt that in the future, STC might have a far different character, they might represent a place for students to print and pick up hardcopy, and might provide access to scanners, but that the focus on desktop computing will almost certainly decline. Printers were considered by far the highest priority. It should be noted that many science departments provide free printing to the students in their classes. Finally, the committee noted that the UITS
Appendix IV: Letter to Dean Ng regarding UITS proposal

document focused heavily on STCs, but that these represent a small (and possibly shrinking) component of the overall UITS budget.

In connection with the discussion of STCs, a few additional points were made by students, faculty, and technology staff. Students, in particular, felt that the installation of large plasma TVs around campus was wasteful (it is not clear whether this was funded by STF income). Faculty and staff noted that we currently have a shortage of reservable computer classrooms.

**Historical use of STF income in the School of Science**
The Committee then turned to an analysis of the ways in which STF income has been used during the last five budget years. As you know, the use of STF has evolved considerably during that period, and has been expected to continue to change over the next several years. This evolution has been driven in part by the increased emphasis on technology staff in the budget, and on the review of laboratory fee structures undertaken as part of the school’s strategic planning exercise in the spring of 2006.

The primary areas of STF expenditure over the last several years are technology staff salaries, the testing facility in SL070, expansion and innovation in laboratory instruction, lifecycle replacement of computers in departmental facilities, and software licenses. Other expenditures include the maintenance of existing technology and supplies/consumables.

**Staff**
Our expenditure on technology staff is expected to be approximately $260,000 for the 2008-09 fiscal year. This figure represents the cost of 8 staff members with an average allocation of 35% FTE on student technology issues (salary, fringe benefits and FTE employee based assessments are included). If we are to hire a webmaster, as has been discussed, this figure could rise by ~$35,000, depending on salary and the portion of the job description focused on education. The committee believes that local technology staff are absolutely essential to the provision of a strong education in the school of science. The staff support student learning in myriad ways, ranging from development and implementation of computer based testing in introductory courses, to helping capstone students produce poster presentations on a large-format plotter. The committee appreciated your strong statement in favor of our staff, so we will not spend further time on this subject.

**SL070 Facility**
SL070 is comprised of four large rooms plus a small anteroom and internal corridors. The primary use of SL070 is as a testing center in which students take computer-based exams in psychology, mathematics, chemistry and forensic science. Testing occupies two of the largest rooms (C and D) full time, and a third large room (B) approximately half time. The smallest of the main rooms (A) is an open STC with 17 seats and a printer that students may access using their Jag-Tag account.
Appendix IV: Letter to Dean Ng regarding UITS proposal

The committee is willing to consider transfer of SL070A management to UITS. This would allow the software in SL070A to be consistent with software in other STCs, and relieve the school of the burden of maintaining those machines, lifecycle replacement, etc. The committee’s primary concern would be the possible loss of flexibility. UITS would need to be responsive to faculty requests for the installation of additional software. Such requests occur when, for example, faculty wish to have students use software developed locally, or software under examination for future purchase.

The committee strongly rejects the notion that UITS can or should even wish to administer the testing center. This is a complex undertaking far outside UITS mission, including the development of specialized software for particular courses, the hiring and training of proctors, and the administration testing procedures.

Expansion and innovation in laboratory technology

The school of science has historically used Student technology fee funds for innovation. Pilot projects have been funded that have lead to the development of new teaching methods using technology and even the development of new courses. Some examples include:

- Online homework exercises demonstrating the application of psychology to everyday life were developed for psychology’s introduction to psychology course, B104. Over 3000 students per year use this system to enhance their learning of the key concepts in psychology. Students are provided with instant feedback while their results from the exercises are recorded automatically in an online gradebook. The use of technology in this course makes it possible to introduce exercises that would not have been feasible in a course with such a large enrollment.

- Pilot projects using gps systems in Earth Sciences were funded with technology fees. Field courses in Earth Sciences such as G420 Field Methods, G431 Wetland Ecosystems and G495 Streams were transformed to include this technology with examples of real world applications. GPS technology in these courses enables real time mapping and data collection. Data is then returned to the lab and loaded into GIS systems where it is further analyzed as part of the course.

It must be noted that STF funds have NOT been used to support simple expansion of laboratory activities, such as purchase of general scientific apparatus and supplies. Prior to the 2006-07 budget, STF funds were used both to purchase equipment to implement new laboratory experiences, and to replace laboratory technology that had become outdated or inoperative. As a part of the effort to restructure School of Science Lab fees, a decision was made to eliminate the use of STF funds for the replacement of lab technology. All lab fees have now been set to enable the departments to make a transition to Lab Fee funds for replacement. The current budget (and 2009-10) may still have some residual replacement use, as the school has established a large installed base of laboratory technology, and lab fees are just being transferred to the departments this year (as discussed in prior correspondence from this committee).
Appendix IV: Letter to Dean Ng regarding UITS proposal

It is the consensus of the committee that the use of STF funds for laboratory innovation is both appropriate and valuable. Students earning degrees in the laboratory sciences must be able to function in the technology-heavy laboratories they will encounter in the workplace or in their professional or graduate studies. Similarly, students taking science labs to satisfy general education requirements must also learn in a laboratory that is an authentic, if introductory, representation of science as it is practiced. It is the faculty in the School of Science who are best able to determine what laboratory technology is most educationally valuable for our students. In developing new laboratory experiences that teach students using modern laboratory technology it is more appropriate to use STF funds than it is to use lab fees, which students understand to represent the cost of the lab that they are taking, not the lab that may be developed for use by future students. The School of Science serves approximately 4700 FTE students each academic year. Budgeting for innovation at a rate of $15/student yields approximately $70,000/year.

Lifecycle replacement of computers in departmental labs
The STF budget has also been used to support the 3 year lifecycle replacement of computers (not including monitors and other longer-lived peripherals) that are used in departmental facilities including teaching labs, resource centers, computer labs, etc. Those in the teaching labs will now be picked up by lab fees (see above). Others, such as those in the Chemistry Resource Center, should continue to be replaced by STF funds. It should be noted that computers in the CRC and other departmental labs are primarily intended to support learning in classroom-based courses, not lab classes. They often include specialized software, e.g., chemdraw and Spartan (molecular drawing and modeling).

Software licenses
The School of Science uses STF funds to purchase annual licenses for a wide variety of software that may be used by students directly, or by faculty and staff in developing educational software, testing software, and other curricular assets. Packages include SPSS, SAS, Matlab, Maple, MapleTA, Minitab, Geometer’s Sketchpad, Spartan, and Iron Speed. Some of these are purchased directly from the publisher, others are purchased through the IU Stat/Math Center.

The Committee agrees that UITS has had great success with the licensing agreements for Microsoft and Adobe products. If this success can be extended to other software that we currently license, the committee is enthusiastic about allowing this to go forward. However, the committee is less enthusiastic about the record of the Stat/Math center, noting that updates are often far behind the published releases. The committee also expressed concern that software, like hardware, changes over time, and the students benefit from our current ability to make quick decisions on adoption of new software. If all purchasing is done through university-wide agreements, special purpose software will likely not be supported, and innovation may be stifled by the need for a state-wide decision making process.

Other expenditures
STF funds have also been used for a wide range of smaller purposes. Some of these are in the process of shifting to the lab fee model (replacement of small items such as computer interfaced...
probes) while others cannot be appropriately covered by that model. Examples in this category include printing supplies and scanners in the departmental labs (most of which provide free printing), backup drives and tapes for servers that support classroom-based instruction, and replacement of those servers. Also inappropriate for lab fee expenditures are a variety of small technology items used in classroom courses such as digital cameras, smart pads, LCD projectors, and laptops.
Appendix IV: Letter to Dean Ng regarding UITS proposal

Recommendations
The committee recommends that the Dean oppose the overall structure of the UITS proposal, though it notes that some areas of centralization may be advisable. Specific recommendations are summarized in the table below.

<table>
<thead>
<tr>
<th>STF expenditures that should remain in the Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Technology Staff</td>
</tr>
<tr>
<td>• SL070 Testing Center functions</td>
</tr>
<tr>
<td>• Innovation fund for new laboratory technology</td>
</tr>
<tr>
<td>• Licensing of specialized software, e.g., Iron Speed, Spartan, MapleTA</td>
</tr>
<tr>
<td>• Funds for miscellaneous technology expenditures</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STF expenditures that may be shifted to UITS for central administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SL070 open lab functions</td>
</tr>
<tr>
<td>• LD225 open lab (room would still need to be reservable)</td>
</tr>
<tr>
<td>• Licensing of general software, e.g., SPSS, Mat lab, Maple, SAS, Chimera</td>
</tr>
<tr>
<td>• Additional funds (phased in over three years) replaced by laboratory fees</td>
</tr>
</tbody>
</table>

In conclusion, we believe that the technology fee income distributed to the schools should not be reduced substantially. The vast majority of our STF expenditures support students in a fashion that is specialized to the needs of students in science classes. Centralization of all but a small portion of STF funds (not already centralized) would result in a loss of ability to innovate and to target the needs of students in our classes.

Sincerely yours,

The School of Science Technology Committee
Appendix IV: Letter to Dean Ng regarding UITS proposal

Appendix I: Technology-based resources for students in School of Science Classes

School wide
SL070 Testing Center:
This center serves over 5000 students in psychology each academic year. Each of these students takes multiple exams and quizzes. These assessment methods are highly tailored to the needs of the individual courses, and include methods such as asking students to analyze images and short clips of audio or video. In addition, approximately 1700 math students currently use the facility each year, and mathematics usage has been increasing rapidly as new courses are added to the list of courses using computer-based testing. An additional 1250 math students are expected to use the facility each year due to expansion that is already underway.

SL070 STC:
This room (SL070 A) is a 17 seat open lab.

LD225 Computer Lab: A 24 seat lab, with an instructor station, that is open approximately 40-50 hours each week. This lab is also used for certain statistics course to meet for class time and for Windows on Science in the Fall semester. This lab utilized the Pharos pay-for-print system but we would welcome a way to allow Science students to print for free. The computer build is designed to allow students to easily complete homework for any of their math or statistics courses using Maple, Matlab, SAS, Minitab, R, MathXL player and plug-ins, and various other software.

Biology
Biology has used STF funds to support innovation and expansion in the biology labs, which serve over 4000 students each year in courses ranging from non-majors survey courses to the senior level. The department uses STF funds to make initial purchases, but expects to use lab fees in future years to fund replacement and maintenance. In recent years, STF funds have been used to equip these labs as shown below.

- Biopac Student Data Acquisition and Analysis System- Physiology data collection (N217, K103). This system has allowed for the elimination of all animal/non-human based experiments.
- Audiometers (N217)
- Projectors- All Biology labs (SL 241, 242, 271, 285, 309, 311, 313, 341, 375)
- Photomicroscopes- Microscopes equipped with digital cameras by image and video capture of microscopic organisms and slides (multiple classes).
- Research microscopes- Research grade microscopes (multiple classes).
- Multicolor Fluorescent Imaging System- Gel documentation (multiple classes).
- Microplate reader (multiple classes).
- Spectrophotometers (multiple classes).
- Student Computers and Instructor desk computers (multiple classes).
Appendix IV: Letter to Dean Ng regarding UITS proposal

Chemistry & Chemical Biology
The department supports the Chemistry Resource Center, the Ted O’Brien Center for Computational Chemistry, and an additional departmental computer lab in LD362. Combined, these resources include 23 computers and 4 printers. These facilities are open to students taking introductory chemistry, general chemistry organic chemistry, chemical informatics, and a variety of advanced chemistry courses. In all close to 4000 students are served each academic year. In addition to the hardware, these centers provide students access to peer mentoring services for over 50 hours each week, and access to specialized several chemistry specific software packages.

The department has also incorporated 17 computers and 6 printers that are interfaced to instrumentation used throughout all labs except general chemistry.

Most of the above hardware and software are used in support of classroom based courses, and cannot be supported by lab fees.

In addition, those computers that may be supported by lab fees, e.g., the 17 machines interfaced to instrumentation, were initially purchased through STF funds.

Computer & Information Science
Computer science maintains the following technology infrastructure in support of its courses. Note that upper level computer science courses do not charge lab fees (only 230, 240, and non-majors courses charge lab fees). Two labs (SL116 and SL 251) allow keycard access to all students enrolled in CSCI courses. These labs provide advanced workstations with capabilities not available in STCs. These labs also provide free printing.

Teaching labs
---------
- SL116: 20 dual-boot workstations with virtualization support; student keycard access; mounted projector
- SL247: 36 Workstations - Windows; mounted projector & scanner
- SL251: 37 dual-boot workstations; scanner; mounted projector; student keycard access

Servers
-------
- General purpose Linux server w/ remote access
- Web server supporting student entry web development course/personal web sites
- 500GB student file server
- Streaming video server (DE instruction)
- Advanced web development/database server - Windows
- Advanced web development/database server - Linux
- General purpose Solaris server/Oracle server

Misc. equipment
----

Appendix IV: Letter to Dean Ng regarding UITS proposal

- PDAs for software development
- Laptop to support teaching
- Digital camera

Software licenses
------- -------
- Matlab
- Maple
- Microsoft MSDN Academic License
- Oracle Server for academic use
- IBM Rational Rose (Software Engineering Dev. Suite)
- RealNetworks Helix Server

Earth Sciences

Mathematical Sciences
Mathematics operates the LD225 lab (listed above under school-wide facilities). The Mathematics Assistance Center (MAC) is independently funded using course-based fees. However, it should be noted that the creation of the MAC was funded by STF funds.

Physics
Physics has used STF funds to support innovation in the labs, which support approximately 1400 students per academic year. The lab equipment is initially purchased using STF, but is maintained and replaced using lab fees (under the new structure). At present, the department maintains two introductory lab rooms containing a total of thirty computer workstations each attached to its own data acquisition system. Vernier hardware/software interfaces allow students to take data directly on the workstation using motion sensors, voltage sensors, and other data acquisition devices (e.g. Sargent Welch Centripetal Force Apparatuses, etc.). The data acquisition system shares an interface with analysis/graphing software. The result is far closer to the systems students will encounter in a research environment than traditional teaching lab equipment.

Physics also maintains junior/senior electronics and optics labs. The courses taught in these labs use highly specified equipment: Stanford Research Lock-In Amplifiers, Agilent Technologies Digital Power Supplies, Cynmar Corporation DC Power Supplies, Optronic Technologies Optics Kits.

STF funds were also used to provide telescopes and digital cameras for our astronomy courses, which serve approximately 900 students each year. These courses have no lab component, but students often wish to have a hands on experience with astronomy. For this purpose, the department used STF funds to purchase ten optical Dobsonian telescopes, an optical refractor solar telescope with dedicated filters, twenty digital cameras with astronomical-lens conversion kits and instruction-based spectrographic equipment. This equipment is available for loan to students
Appendix IV: Letter to Dean Ng regarding UITS proposal

in the astronomy courses. In some cases, instructors offer extra credit for projects using this equipment, but it is not required.

Psychology
Resource Center (SMART boards, computer stations)
Peer Advising Center (computer stations, high end printing)
Computer programming support for innovative web-based computer exercises for undergraduate courses