

1. Categorized ETF Expenditure Summary

- a. Personnel
 - Total spent for professional support staff (salary + benefits) \$0
 - Total spent for student-worker staff (salary + benefits) \$0
- b. IT infrastructure, equipment and services (computing labs, networking, etc.) \$0
- c. Non-IT infrastructure, equipment (experimental labs, wet labs, etc.) \$67,495.11
- d. Facilities (repairs and renovations, furniture, etc.) \$0
- e. Discipline/instructional related field trips, professional development/experiences, travel, conferences, services etc. \$0
- f. Other/miscellaneous \$0

2. Justification/Purpose of Expenditures– strategic overview

In each subsection below, please include a brief description of the direct services and resources provided to students.

- a. New and/or transformative initiatives undertaken with ETF
 - Describe how your unit has used funds in progressive and innovative ways
ETF funds were used to develop and purchase supplies for a class in tissue engineering, the first tissue engineering class offered at NCSU. In addition to supplies purchased with ETF funds, existing BTEC facilities and additional equipment purchased by BTEC specifically for this courses were used to equip the lab. The class is one of the core courses in the recently approved tissue engineering minor. The class is based on the BTEC model with 5 hour lab sections and 2 hour lecture sections meeting once a week for an 8 week period. As part of the class, students grew epidermal cells, induced differentiation into different dermal layers, investigated the potential for angiogenesis (growth of new blood vessels into the tissue) and learned histological techniques for evaluating the overall health of the tissue.
 - Describe how your unit continues to rethink and reassess use of funds to improve teaching/learning/business models to maintain nimbleness, adaptability, etc..
Rapid Prototyping Machine: After receiving a request from a BME industrial partner for a part manufactured using the Rapid Prototyping Machine (RPM) purchased with ETF funds, the department addressed the possibility of honoring similar requests within the intended guidelines of usage of equipment purchased with ETF funds. The model that was approved was one where students would interact with industry leaders and produce the part. In this way, students receive the educational experience of communicating with an industrial representative on design specifications and the hands-on experience of using the RPM machine. In turn, the industrial leader would be asked for a donation to purchase

supplies for the RPM machine both to cover the cost of the production of the requested part, and to supply teaching labs with RPM material. This model has been successfully implemented to make a part for Applied Technologies in exchange for a \$150 donation for RPM supplies.

Discounted purchases: We continue to negotiate educational and bulk discounts from vendors and to look to surplus and 2nd hand markets for discounted equipment.

- b. Actions taken to improve efficiency/return on ETF investments–
- Describe your unit's efforts to increase/maximize the value of ETF expenditures

Telecommunications upgrade: This year, a high priority of the ETF committee was an upgrade of the telecommunications equipment in our teleclassrooms. Our graduate students were complaining that the sound quality in teleconferenced classes was poor and the need to reboot older equipment caused unnecessary delays in classes. The ETF committee agreed to fund the improvement from existing ETF funds if needed, but we requested a cost-sharing arrangement from the department for the upgrades. In the end, we were able to purchase \$45,000 of state of the art telecommunications equipment with \$2500 of matching funds from ETF.

Tissue engineering: BME collaborated with BTEC to use existing BTEC equipment and to purchase new equipment and supplies in order to offer the pilot course in tissue engineering.

- c. Unmet ETF-eligible needs

BME continues to plan for its move to EBIII in the summer of 2010. At this time, many of the laboratory classes that are currently conducted in BAE space using BAE equipment under a rental agreement with BAE will be moved to EBIII. Continued sharing of lab equipment and space isn't feasible due to the increased enrollment in both BAE and BME. BME has been continually investing in the necessary equipment to outfit new labs.

Equipment that is still needed includes:

Bioinstrumentation lab equipment

1 oscilloscope	≈\$1550	
4 bench multimeters	≈\$3400	
3 arbitrary waveform generators		≈\$4500
3 power supplies	≈\$3000	
3 logic probes	≈\$150	
2 handheld multimeters	≈\$1050	
3 DAQ boards	≈\$900	
3 flat panel monitors	≈\$700	

Biomechanics lab equipment

metamorph software	≈\$6,600	
Freezer	≈\$700	
Refrigerator	≈\$2000	
10 Data Acquisition systems for strain gages		≈\$30,000
2 Bone Saws	≈\$2000	

adequacy of lab facilities, equipment and supplies on a scale of 1-5 with 5 being most adequate, students rated the courses as follows:

	2006-2007	2007-2008	2008-2009
BME 342	4.5	4.22	3.6
BME 441	3.81	4.09	4.2

Given the shared nature of the laboratory equipment for the two courses, the feedback is contradictory. BME 342 students have become increasingly dissatisfied with the availability of equipment, while BME 441 students have become increasingly satisfied. Equipment needs for lab exercises specific to BME 342 will be investigated and addressed with ETF funds in the upcoming year if needed.

Design: Similarly, our design lab has been a long-term recipient of ETF fund investment. Responses of senior design students when asked about the adequacy of available equipment are shown below.

	2006-2007	2007-2008	2008-2009
BME 452	3.5	2.73	3.7

We realize that our design lab is still missing many necessary pieces of equipment and will continue to invest ETF funds to improve the design facility.

Tissue Engineering: The tissue engineering class was offered for the first time this year. Student feedback was very positive, so we will continue to use the same format for the class this fall. Average responses from 6 students are shown below:

Overall, this course is excellent:	4.8
Lab sessions contributed to the mastery of course concepts:	5.0
Lab facilities, equipment, supplies, etc. were adequate:	5.0

e. Planning and review process

- Describe your internal review process and level of student participation, student committee, etc.

Faculty and students are asked to propose to the committee needed equipment for labs and classes. The ETF committee ranks the requests and funds requests in rank order to the level that can be supported by our ETF fund allocations. The committee consists of 3 faculty members, 3 students (junior, senior and graduate student), the BME lab manager, and a BME IT specialist. Student member opinions are highly valued by the committee.

3. Summarized List of Expenditures by Account Code

Your college/unit business officer should provide you with a summarized list of ETF expenditures by account code

- Please review and verify accuracy of this information
- Total in #1 should match total in #3