LEQSF(2007-12)-ENH-PKSFI-PES-07

"P-KSFI Xavier Biothrust 21: Rebounding from Katrina and Achieving New Heights in Educating a 21st Century Biosciences Workforce"

PI: Shubha Ireland

Lead Institution: Xavier University of New Orleans

Contents:

I. Proposal Narrative (Without Appendices)
II. Contract Work Plan
III. Year 3 Annual Report
IV. Year 2 Annual Report
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Proposal Narrative (without appendices)

COVER PAGE FOR POST-KATRINA SUPPORT FUND INITIATIVE
PRIMARILY EDUCATION SUBPROGRAM PROPOSALS
BOARD OF REGENTS SUPPORT FUND, FY 2006-07

009PKSFI-E-07

1. Primary Submission Discipline: √ Biological Sciences _ Information Technology _Materials Science (check only one)	(For BoR Use Only) Application Number:
2. Name of Lead Institution of Higher Education: (Include Branch/Campus/Other Components) Xavier University of Louisiana	
4. Title of Proposed Project: PKSFI/Xavier Biothrust 21: Rebounding from Katrina and Achieving New Heights in Educating a 21st Century Biosciences Workforce	

5. Funds Requested:	P-KSFI Year 1:	ESIP (Year 1 only):	Total Project Request:	6. Proposed Duration: (Circle # of Yrs.) 1 2 3 4 (√) 5
$1,487,785.00	$ 122,125.00	$ 150,000.00	$1,487,785.00	

7. Name(s) of Partnering Institution(s):

8. Does This Proposal Contain Confidential or Proprietary Information Which Falls Into a Category Described in R.S. 44:4(16)?
__YES √ NO (NOTE: If YES, the proposal MUST be appropriately marked.)

By signing and submitting this proposal, the signators are certifying that: (1) the proposed project has not already been funded/is not currently being funded/has not been promised funding; (2) this proposal has been reviewed and approved by an Institutional Screening Committee; and (3) the institution and the proposed project are in compliance with all applicable Federal and State laws and regulations, including, but not limited to, the required certifications set forth in: (a) Grants for Research and Education in Science and Engineering, NSF Grant Proposals Guide (GPG), NSF 03-2, effective 10/1/02, and (b) 45CFR 620, Subpart F (Requirements for a Drug-Free Workplace).

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(Form 1-PKSFI-PES, 1-2007)

PROJECT SUMMARY

Name(s) of Lead Institution (Include Branch/Campus and School or Division) and Partnering Institution(s):

Xavier University of Louisiana

Address of Lead Institution:
1 Drexel Dr.
New Orleans, LA. 70125

Principal Investigators:

Dr. Shubha Kale Ireland

Title of Project:

PKSFI/Xavier Biothrust 21: Rebounding from Katrina and Producing a Larger, Better Prepared 21st Century, Biosciences Workforce for Louisiana

Abstract (DO NOT EXCEED 250 WORDS):

Nationally, the number of science majors has been decreasing at an alarming rate. This has become a major problem because of the need for such workers in advanced technology industries, the fastest growing sector of the economy. In addition, the participation of African Americans in the STEM (Science, Technology, Engineering and Mathematics) workforce is especially low. This is a particular challenge in Louisiana, because it has the second highest proportion of African Americans in the nation. Numerous studies have shown that we do not have a sufficient technological workforce to support advanced technology companies.

For more than a decade, Xavier has ranked first nationally in the number of African American students earning bachelors degrees in biology, physics, and the physical sciences overall. Additionally, it has always been Xavier's mission to work with students who often come from poor schools in urban areas and help them succeed.

The focus of this project will be to create a model integrated curriculum focused primarily on fundamental biology "gatekeeper" courses and support systems that will increase retention of Freshmen and Sophomores. The project will include elements of the PES initiatives, namely:

- Strengthen student support systems by providing more mentoring and individual support.
- Revise labs to contain more interdisciplinary principles, to include experiential/guided discovery exercises and to ensure that they are BIO 2010 compliant.
- Enhance research experiences.
- Provide internships in local biosciences industry.
- Provide integrating activities, such as co-registering a small group of students in the same classes for the first year to form dedicated study groups and to discourage compartmentalization of information.

In achieving these goals, Xavier not only will rebound from the negative impact of Katrina, but also achieve a new level of excellence in its nationally renowned biology curriculum and, thereby, become an even greater asset to the Biosciences industry in New Orleans and Louisiana by producing a 21st Century workforce.

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PKSFI/Xavier Project Goals and Objectives

The final goal of PKSFI/Xavier Biothrust 21 is to enhance the quantity and quality of Louisiana's biosciences workforce by: increasing retention of Xavier University Biology majors by at least 30% and assuring that the freshman & sophomore courses and labs they take meet the recommended standards of NRC's Bio 2010 report. To achieve this goal Xavier faculty will: revise and expand the content of year one General Biology courses (I and II); revise existing and develop new laboratory exercises for General Biology II and the second year Microbiology course to make them more inquiry based and quantitative; provide more effective feedback mechanisms that will allow instructors to better gauge student understanding of course content both in and outside of the classroom; enhance tutoring, technical writing, mentoring and advising support systems; develop a program to provide internships in local biosciences companies; carry out ongoing formative and summative evaluation of all activities; and disseminate the strategies and materials developed in Biothrust 21 to other Xavier science departments and other universities regionally and nationally.

Schedule of Activities [See Appendix A for table showing schedule of activities.]

Year 1 – Revise and test workbook-based modules and first half of instructors guide for General Biology I & II; design and test new lab exercises for General Biology II; revise and test existing microbiology lab exercises; develop a plan for technical writing workshops and other activities to assist students in enhancing their writing skills; launch Office of Academic Enhancement; hire Biology tutoring coordinator who develops and tests new instruments for selecting and evaluating tutors; with GNO Inc., develop and implement Biosciences Internship program; introduce and test use of electronic Personal Responders.

Year 2 – Based on evaluations, revise and implement revised workbook-based modules and lab exercises in all sections of General Biology I & II and add interdisciplinary content; complete and implement full instructors guide; develop remaining Microbiology lab exercises and test all exercises based on evaluations; revise use of Personal Responders based on feedback and implement in all sections of General Biology I & II; explore potential out-of-class Electronic Testing Assessment (ETA) systems; revise and implement student tutor selection and evaluation instruments; develop tutor training materials; hire additional tutors; test training materials and expand tutoring hours; implement writing workshops and system to track student-progress on written assignments; revise bioscience internship program based on feedback and programmatic materials developed for students.

Year 3 – Revise all materials and lab exercises based on evaluations; develop and implement faculty training workshop for use of Personal Responders; Begin testing of ETA system in one course; implement portfolio writing approach and integrate General Biology II lab reports into Blackboard and technical writing program; continue implementation of revised workbooks, labs and faculty guides.

Year 4 – Implement ETA system as appropriate; continue implementation of workbooks, lab exercises, faculty guide, and student training materials; evaluate and fine tune overall program; develop dissemination materials and begin dissemination activities.

Year 5 – Continue implementation and dissemination activities, carry out final formative and summative evaluation and write final report.

PKSFI/Xavier Biothrust 21: Rebounding from Katrina and Producing a Larger, Better Prepared 21st Century, Biosciences Workforce for Louisiana

A. Project Rationale and Structure

A(1) Context

A(1)a National, State and Local Context/Economic Challenge: Attracting & Growing Advanced Technology Companies

Report after report, both national and regional, have shown that, since World War II, the advanced technology sector of the economy is growing most rapidly. [5, 16, 17] Internationally, advanced technology is seen as the catalyst and launching pad for new jobs and new wealth. These same economic reports show that the geographic areas most successful in attracting and growing such companies are those that have a strong research base, as well as large and deep labor pool of technically skilled workers, ranging from individuals who are skilled in basic mathematics and science, to those who can create the ideas upon which new technologies are based (STEM). [3, 12, 16]

In recent years, Louisiana has become more active in building the state's science and engineering base to attract advanced technology businesses. New Orleans, in particular, has become increasingly focused on growing its bioscience and health related industries. [5, 12] Prior to Katrina, the City had growing strength in bioscience fields; post Katrina, these continue to be recognized areas of strength. Furthermore, New Orleans economic development groups such as Greater New Orleans Inc., the Regional Planning Commission and the Chamber of Commerce, over the last five years, have increasingly emphasized the biosciences sector as a base on which to build the city's economy. The State of Louisiana has supported this biosciences initiative with substantial grants in the areas of Neurosciences, Gene Therapy and more recently, $10 million per year to launch the Louisiana Cancer Research Consortium lead by Tulane and the LSU Health Sciences (LSUHSC) Center. Last year, the Louisiana Legislature created the Medical District of New Orleans to form an enhanced partnership between LSUHSC, Tulane, Xavier and businesses to promote the biosciences industry.

To take advantage of the opportunity for attracting and growing Advanced Technology Companies, both our nation and Louisiana must address a critical challenge. National studies are once again pointing to decreasing numbers of US students going into STEM disciplines at both the undergraduate and graduate levels. [3, 13, 14, 23] Since 1993, enrollment of US students in STEM programs has dropped nine percent and continues to fall. Only 69% of STEM advanced degree recipients today are US citizens. This data is representative of low retention rates among US students who enter college as STEM majors. Surveys show that 25-30% of entering college freshmen intends to major in science and engineering, however, only half complete their degree. This also has a negative impact on research, since it creates a very limited pool of Ph.D.s to work on advancing new technological ideas, as well as technicians to help researchers move these ideas forward.

One potential source for increasing the STEM workforce is the US African American population. African Americans obtain far fewer science degrees than should be the case, given their percentage of the US population, namely, 13%. In mathematics, engineering and the life and

physical sciences, less than 10% of the bachelor's degrees, less than 5% of the master's degrees, and less than 3% of the doctoral degrees are conferred to African Americans. [7, 18, 19] These small percentages can be attributed to a number of factors including urban school systems that do not adequately prepare African Americans in mathematics and science disciplines and, at the university level, a lack of student focused curricula, faculty mentoring and effective advising. [10, 22] Low levels of success in science curricula also lead to a low percentage of African Americans going into the health sciences and medicine.

Like the rest of the nation, Louisiana and New Orleans need more scientists, engineers, health professionals and other technically trained individuals. Decades of economic development studies of Louisiana have shown the States' greatest barrier to growing and attracting more advanced technology companies is the lack of a sufficiently large, STEM labor pool. [3, 5] New Orleans, in particular, lags in critical areas of biosciences-related employment. The 2004 Biotech Workforce Evaluation of the Greater New Orleans area by Moran, Stahl, & Boyer pointed out that there is a need for 40% increased growth in biotech employment by 2009, especially in the areas of laboratory technologist and technicians, research scientists, medical research specialists, medical technicians, and clinical research coordinators. [12] Unlike the rest of the nation, Louisiana has the second highest proportion of African Americans in our population. This presents a unique challenge and a unique opportunity for our state.

We cannot enhance Louisiana's capacity to carry out internationally competitive STEM research, without assuring a pipeline of faculty to lead such research efforts and technicians, laboratory assistants and graduate students to operate our research laboratories. We also will not be able to translate our enhanced research capacity into advanced technology industries in Louisiana, unless we can simultaneously produce the necessary STEM workforce to support this effort. Enhanced research capacity will not promote economic development in our state if our ideas are taken out of Louisiana to develop new companies in regions that have a stronger STEM workforce. And, this is the challenge that Xavier University is uniquely positioned to address.

A(1)b Institutional Context – Xavier as the nation's #1 producer of African American STEM graduates

Xavier University of Louisiana is Catholic and historically Black. Prior to Katrina, Xavier's enrollment was at a record breaking 4204 students. 1,442 of these students were Biology majors. At the beginning of the 2005-2006 academic year post-Katrina, the University enrolled 3,091 students; 844 were Biology majors. Based on applications for Fall 2007, Xavier will be able to return to its former enrollment, though we intend to do so gradually over the next 3 to 4 years.

Remarkably, fully 64% percent of Xavier's undergraduates major in STEM disciplines, even though the University has remained close to its liberal arts roots with a core curriculum of 66 credit hours. According to the U.S. Department of Education, Xavier, during the past decade, has ranked first nationally in the number of African American students earning undergraduate degrees in biology, chemistry, physics, and in the physical sciences overall. Many well-prepared, highly motivated students are attracted by Xavier's reputation in this regard. Conversely, academically disadvantaged students are also drawn to Xavier because of its track-record in

"leveling the playing field;" especially in the first year of college, such students can have a reasonable hope of "beating the odds."

As a result of its successes in STEM education, in 2005, Xavier received the National Education Award from the American Institute of Biological Sciences. This award is presented annually to individuals or groups who have made significant contributions to education in the biological sciences. Also, Xavier is one of only six schools in the nation chosen to participate in the National Science Foundation's Model Institutions for Excellence in Science, Engineering and Mathematics program. In recent years, NSF has funded Xavier to disseminate components of its STEM courses and curriculum nationally through publications in journals, faculty presentations at national conferences, and distribution of program materials in the form of brochures and CD-ROMs. Xavier has also been funded to organize regional and national conferences that have resulted in dissemination of significant components of the university's STEM curriculum to other institutions and for which Xavier has received excellent evaluations from NSF.

As has been demonstrated by National Science Foundation sponsored studies [17, 18, 19], undergraduates who are engaged in STEM faculty research projects in their first two years have a significantly higher likelihood of becoming STEM majors. STEM students involved in faculty research projects in their junior and senior years have a much higher likelihood of going onto graduate school in the sciences. Xavier is strongly committed to engaging its students in research and, to further promote this, has launched the Center for Undergraduate Research (CUR). This Center, established in 2000, is dedicated to supporting and promoting undergraduate research, creative expression and other scholarly experiences for Xavier's students. The CUR Office works with both faculty and students to increase the opportunities for research on and off campus by: seeking partnerships with other institutions, industry, non-profit and governmental agencies; seeking funding for faculty members and students; exploring ways in which teaching and research can be integrated; and participating in national dialogues, and locating off-campus research for students.

Xavier has a variety of programs to support undergraduate student research, funded by the National Institutes of Health, such as the Minority Opportunities in Research Program (MORE), which administers research and research training programs aimed at increasing the number of minority biomedical scientists. MORE Programs at Xavier support students and faculty through the Minority Biomedical Research Support (MBRS) Program and the Minority Access to Research Careers (MARC) Program. Xavier 's MBRS-RISE Program provides research opportunities for undergraduate minority students in all STEM disciplines. This program is designed to promote the interest of our students in biomedical research careers, strengthen student research competence, better prepare the participating students for graduate school, and enhance the capability of Xavier University faculty for participation in biomedical research. The MARC Program has two primary goals: to increase the flow of competitively trained minority undergraduate students into Ph.D. or combined professional/PhD. programs and to improve the academic preparedness of undergraduates for graduate study by strengthening science curricula at minority serving institutions.

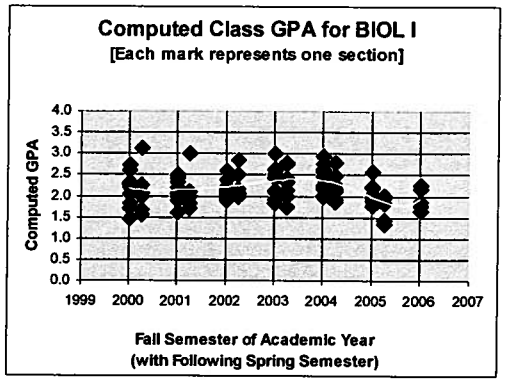
The University, particularly its Biology Department, has state-of-the-art research and laboratory infrastructure available for use by faculty and student research projects, described in section C below, "Leverage Resources."

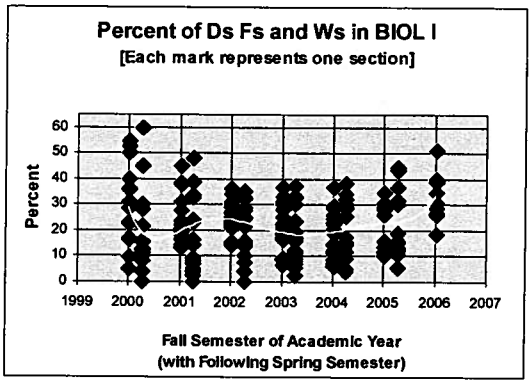
A(1)c Institutional Challenge/Need

An integral part of Xavier's mission is "the promotion of a more just and humane society." Consistent with this mission, Xavier typically works with students who come from poor schools in urban areas and help them succeed. Xavier attempts to prepare its students to assume roles of leadership and service in society. This preparation takes place in a pluralistic teaching and learning environment that incorporates all relevant educational means, including research and community service. For STEM majors, Xavier has developed a series of summer programs to help high school students with math and science preparation, namely: MathStar - a problem-solving based program that provides preparation for high school algebra; BioStar - a problem-solving based preparation program for high school biology; ChemStar - a problem-solving based introduction to high school chemistry; and, SOAR (Stress On Analytical Reasoning), a four week problem-solving/ACT/SAT prep for high ability rising High School Seniors interested in medicine, dentistry, pharmacy, biology, or chemistry.

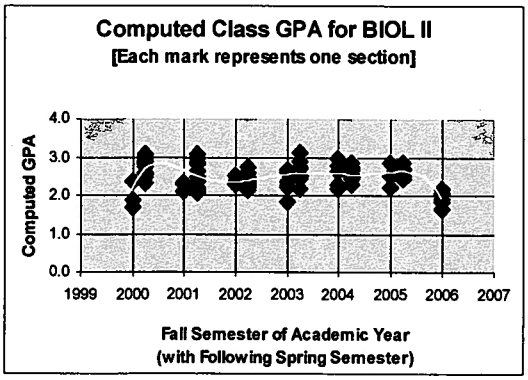
Through the NSF HBCU-UP program, Xavier has launched the EPsAR (Experiential Problem-solving and Analytical Reasoning) Summer Program. EPsAR is designed to give students who did not score highly on the mathematics portion of the ACT or SAT test and who are interested in STEM disciplines an opportunity to (1) strengthen problem-solving and critical-thinking skills, (2) develop a close-knit study group of their peers, (3) learn cooperation and how to participate in group activities for future group projects, and (4) become eligible for additional scholarship assistance. Upon successful completion of the program, students can test into a more advanced mathematics course at Xavier.

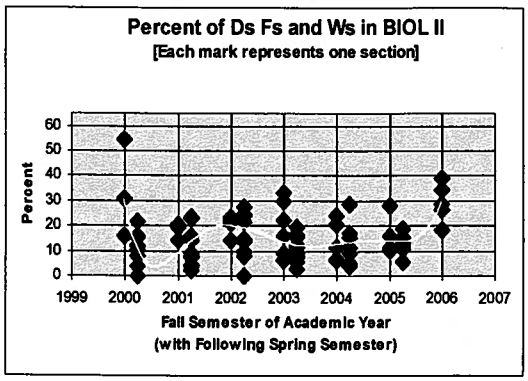
While Xavier has made great strides in its effort to retain STEM majors, significant challenges still remain, particularly with our Biology curriculum. The student performance graphs below show data obtained from individual sections of our General Biology courses, I and II, over the past 6 ½ years. A downward trend is evident, particularly during the 3 post-Katrina semesters, as indicated by the increasing percentages of D's, F's and W's, and decreasing class GPAs.





(Note: Each mark on the above graphs represents each General Biology section. The X-axes represent the semester while the Y-axes depict either 'class GPA' or % Ds, Fs and Ws.)





If the performance at midterm is taken into account, then the numbers are equally, if not more, worrisome. For example, for Biology I and Biology II, in the Fall 2006 semester alone, the average % of Ds and Fs at midterm for all sections was over 68% (with no curving, no extra credit etc). Some of these students ended up dropping the courses, others repeating it, yet others just barely passing. In fact, about 39% of our Biology majors have to take at least one of these courses twice, and 42% drop out of science altogether.

Retention is also a major challenge in Xavier's year 2, Microbiology course. This course is taken not only by all Biology and Microbiology majors but also by Chemistry pre-meds and pre-Pharmacy students (since it is a requirement for admission to Pharmacy programs). The pre-requisites for this course include successful completion of General Biology I and General Biology II. In part, due to the vast amount of detailed and complex information that must be covered in this course, retention has become a major challenge. In addition, students who 'barely squeeze' through General Biology I and II have a difficult time going beyond midterm. Just last year alone, the average number of Ds and Fs at midterm for Microbiology lecture and some labs were about 45%. Again, some students withdraw after midterm, yet others decide to continue but unfortunately do not do well and yet others pass with minimum passing grade. Clearly, this student population needs significant assistance, and the retention problem in Microbiology stems largely from the challenges described earlier for General Biology I and II.

It is also important to note that, while FY '06-'07 biology major applicants are increasing, the percentage who are in the top quartile of academic achievement – GPA of 3.0 or above and ACT of 25 or above – decreased from 18% (pre-Katrina) to 9%. This means that, those Biology students who are admitted will need more assistance than past students, presenting even greater retention challenges.

The second challenge Xavier and many other Biology curricula face has been delineated by the report of the National Research Council's Committee on Undergraduate Biology Education "Preparing Research Scientists for the 21st Century." As stated in the report, "biological concepts and models are becoming more quantitative, and biological research has become critically dependent on other scientific disciplines. The connection between the biological sciences and the physical sciences, mathematics and computer science is rapidly becoming deeper and more extensive." [15] In order for scientists to be competitive as well as productive, they must possess the skills to identify, utilize, and apply appropriate methodology and technology to their research

endeavors and they must be proficient at communicating their ideas and conclusions. This new culture of teaching and learning biology requires an interdisciplinary and inquiry based approach that emphasizes the physical sciences, mathematics, and technology. It would be very difficult to expect students to compete in an increasingly interdisciplinary and technology-driven field/discipline if they have not been exposed in theory, application, and practice during their formal education. In this regard, the way Xavier educates its biology majors at the undergraduate level has not changed enough over time. Several courses can benefit from inclusion of new labs, more technology-based teaching, and the addition of newer and more 'trackable' assessment tools, etc.

A(2) Project Focus

This project will increase retention of Biology majors in their first two years by at least 30% (if not more) over the period of five years and assure that the courses and labs taken by our majors meet the recommendations of Bio 2010, in that our students will be well prepared to take on even more rigorous and more interdisciplinary courses in their 3rd and 4th years. In achieving these goals, Xavier not only will rebound from the negative impact of Katrina, but also achieve a new level of excellence in its nationally renowned biology curriculum and, thereby, become and even greater asset to the Biosciences industry in New Orleans and Louisiana by producing a larger, better prepared 21st Century workforce. Given this, we have named the project "PKSFI/Xavier Biothrust 21." Biothrust 21 goals will be accomplished by:

- Revising and expanding the content of year one General Biology courses I and II;
- Revising laboratory modules in the year one, second semester General Biology course (II) and in the second year Microbiology course to make them more inquiry-based and quantitative and include experiential/guided discovery;
- Providing more effective feedback mechanisms that will allow instructors to better gauge student understanding of course content both in and out of class;
- Enhancing tutoring, mentoring and advising support systems for students in their first two years of Xavier's Biology curriculum;
- With the Greater New Orleans Biosciences industry, developing a biosciences internship program for Xavier students to better acquaint them with the needs of the biosciences industry as well as opportunities therein;
- Developing mechanisms that will assure Biothrust 21 strategies, programs & materials developed are disseminated to other Xavier courses in Biology, other Xavier STEM departments and to other universities locally, regionally and nationally.

Biothrust 21 will incorporate all three primarily education subprogram initiatives, namely, interdisciplinary science, mentoring culture and experiential learning.

A(3) Personnel

In this proposal Dr. Shubha Kale Ireland, Professor and Chair of the Biology department will serve as the PI. Dr. Ireland has been active in teaching, research, advising and more recently, administration. She has received several competitive external grants from federal agencies such as NIH, DOD, DOE and USDA. She currently serves as the Director of the Molecular Core Facility funded by Sherman Fairchild. As a teacher, she has developed BIOL 2010 compliant Tissue Culture course while as a researcher, she has mentored over 70 students in the past five years, many of whom have proceeded to pursue graduate, medical or other professional degrees.

As the Chair of the department, she is committed to assess and revise each and every course on 'as needed' basis.

Dr. Dr. Deidre Labat the former Sr. VPAA for Academic Affairs who has returned to Biology as a Professor will serve as the Co-PI. In the 1970s, she was instrumental in developing the original Biology curriculum. She has been a recipient of numerous honors and awards as described in her CV. Her vast experience in various levels of administration along with her national recognition in teaching (example, recently she won the national award from AIBS, American Institute for Biological Studies for her contributions to the field of Biology) will be valuable assets to this proposal.

The faculty members involved in the actual revision and development of new modules and exercises will include:

- **General Biology I:** Dr. Mary Carmichael, course coordinator and Associate Chair of Biology, has taught this course for over 8 years. Dr. Hema Bandaranayake has taught this course for over 5 years. Dr. Labat is currently teaching this course.
- **General Biology II:** Dr. Michelle Boissiere, course coordinator and former chair, has taught this course for over 10 years. Dr. Harish Ratnayaka has taught General Biology II for 4 years.
- **General Biology II Lab:** Dr. Tanya Mckinney is the P.I. for Xavier's NSF/MIE Program and has taught this course for 6 years.
- **Microbiology Lab:** Dr. Joseph Ross, former chair of the Biology Department, developed the Microbiology lab manual and has taught this course for 14 years. Dr. Ireland revised the lab manual and taught this course for 10 years.
- **Instructional Development:** Personnel in the Xavier's Center for the Advancement of Teaching, representing years of expertise in developing innovative instructional materials, will assist faculty in the development of course modules and lab exercises. In addition Dr. Gene D'Amour who has created and disseminated national models in science education, been a Program manager in NSF's Science Education and Research Division and been a consultant in instructional development and faculty development in instruction to more than thirty universities, foundations and government agencies, will assist in the administration of the project and in dissemination.
- **Evaluation:** Dr. Cecile Brookover, assistant professor in Xavier's Department of Psychology has published in a wide variety of professional journals and been supported by NIH grants for the last five years to evaluate Xavier's MBRS-SCORE, MBRS-RISE and MARC programs.

The University is fully committed to this project as can be seen in the university's commitments to new programs and sustained funding described in section C. Biothrust 21 is one of Xavier's highest priorities as demonstrated in its last strategic plan, adopted in 2003. This plan included four priorities, two of which were to "Increase scholarships for deserving students, with a focus on attracting and retaining larger numbers of African American males." and to "Promote Excellence in Teaching and Research and Increase the number of Xavier students entering graduate and professional schools by enhancing the University's technology infrastructure and providing a state-of-the-art learning and research environment.

B. Work Plan

B(1) Proposed Work

B(1)a Revise and expand the content of year one General Biology courses (I and II) and enhance to include Bio 2010 concepts (history and rationale).

The evolution of the current curriculum in Biology dates back to the 1970's when a group of Xavier science faculty began meeting to explore ways of increasing retention of science students. Several Biology faculty members, including Dr. Deidre Labat, along with faculty members from Physics and Mathematics, actively participated in this project. Faculty realized that, while many of the students had excellent preparation for college level science classes, some were under-prepared for these classes. As a result of this collaboration among science departments, Xavier successfully applied for an NSF CAUSE grant. With this funding, faculty from Biology, Chemistry, Physics and Mathematics began extensive revisions of their introductory courses. In order to gain a better understanding of what was being taught in each of these disciplines, faculty sat in on each other's classes. The result of this collaboration was the development of courses in each discipline with specified course content. The Biology I and II courses resulted from these efforts. Thus, long before the Bio 2010 report was published, Xavier's Biology curriculum had already implemented many of its recommendations.

Prior to Katrina, the university had 1442 Biology majors and currently there are 844. Differences between course sections (pre-Katrina, as many as 13 sections taught by different instructors, with 45 to 50 students per section) are minimized with the use of common workbook-based modules that focus on specific learning goals. (See sample in Appendix B) These modules were designed, first, to standardize the course content to ensure that all students receive equivalent introductions to the topics in the syllabus, which constitute an overview of the major areas of biology, and second, to assist the students as they study the course materials. Prior to the standardization of the course, faculty tended to spend more time on certain areas while neglecting others. This meant that some students moved on to upper level courses without the background needed for success in those more advanced courses. This was especially damaging to those academically disadvantaged students arriving at Xavier who were inadequately prepared at the high school level for college-level instruction. In addition, many high achieving students arrive at college with poor study skills. They often must develop new learning strategies, since what "worked" in high school to master the material and receive good grades very often soon falls short. Xavier's General Biology, workbook-based modules inform the students what specific information they are expected to learn and know, provide homework sheets to fill out and, where necessary, offer supplementary, explanatory handouts. The organization of the material helps students organize their approach to biology and assures that individual faculty members who teach the course have clearly delineated learning goals. Teaching specific course content is further reinforced through the administration of common exams, taken outside of class by all students at the same time. Xavier is recognized as a leader in science education in large part because of its Biology and Chemistry workbook-based module approaches.

While Xavier has been extraordinarily successful in educating and graduating scientists, this success and the passage of time have brought many new challenges that the university now needs to address:

- During the last two decades, both the quantity and complexity of instructional materials have increased substantially, as has the number of students we serve.
- In more recent times, since more and more students are not prepared to take college-level courses, it has been quite challenging to successfully cover all modules because without students' understanding the concepts, it would be counterproductive to simply move on.
- Due to the above mentioned factors and others including changes in personnel, growing class sizes and the disruption of Katrina, some of the modules that were previously included in our general biology courses are not taught in adequate detail or sometimes not even covered. For example, important topics such as tissues, internal transport, digestion, gas exchange, and excretion sometimes have to be omitted in order to have more time to explain basic chemistry, cell biology, energy transformations, metabolism and photosynthesis. In other words, because many students have deficiency in their 'fundamental knowledge,' a significant amount of time must be invested in covering the basics. Naturally, this leaves less and less time to cover the modules stated in the syllabus. Over time, fewer and fewer modules get adequately covered and this in turn leaves a greater burden for other courses which now must cover what is not covered in General Biology I or II. Due to these reasons, in Biology I for example, only about 50-60% of the original modules are covered adequately. The number of modules in Xavier's second General Biology course II also has decreased from 100% to about 75%
- From a student's viewpoint, even with increased clarification of the basics and new topics, traditional learning strategies involving quiz- and exam-based assessments do not produce rapid enough feedback for instructor adaptation of content emphasis and delivery speed. By the time a more poorly prepared student realizes that his or her study habits are inadequate, they are usually disillusioned, dispirited, and poised for failure at worst, or struggling to pass at best.
- In order to reintroduce omitted modules into General Biology I, a goal which is supported unanimously by all Xavier Biology faculty, it will be necessary to streamline the modules and speed up the rate of delivery from 1 module per 2 weeks (currently) to 1 module per week (anticipated 2007/2008).
- Similar, though less extensive revision will be needed in General Biology II. Although no topics will be deleted, it is essential that the depth of coverage will change. For example, certain metabolic processes such as aerobic respiration are covered in depth in Microbiology and could be introduced and described much more briefly in General Biology I than is currently the case. Completion of workbook homework assignments will be mandatory. Students will download and print the workbook-based modules from Blackboard. Feedback will be provided by section instructors and through the Tutoring Center (see **B(1)d** below).
- At the present time, there is no formal mechanism in place in either of the General Biology courses that informs instructors as to the depth of coverage. Since there are common exam questions, this is particularly problematic for new instructors. Thus, an "instructor's guide" will not only be of great value in both General Biology I and II, but will become necessary as more topics are included, since all topics must then be presented with a more general approach, and at a faster pace. This instructors guide will assure that faculty teaching General Biology courses will cover the same, specified topics at the same (introductory) level, using the same key definitions, examples, vocabulary,

etc. Instructor guides also may be useful as module supplements for the students to further increase uniformity across course sections and instructors.

B(1)b Revise and develop new laboratory exercises for General Biology II and the second year Microbiology course to include experiential/guided discovery and to ensure they reflect BIO 2010 recommendations

❖ **General Biology I and II labs -** Working with Xavier's Center for the Advancement of Teaching in year 2000 (see Section **B(1)e** below), funded through a Mellon grant, Dr. Chris Doumen, the coordinator of Xavier's General Biology I labs spearheaded efforts to completely revamp laboratory exercises. Several new exercises were developed challenge both (1) those incoming freshman who were very well-prepared for college education and who had excellent SAT and/or ACT scores as well as (2) those who had deficiency in Math and/or reading and overall had not been exposed to enough analytical reasoning and/or writing skills. With the unanimous support from the department, this project moved forward and resulted in the current set of highly coordinated laboratory exercises (see attached syllabus).

Each General Biology I lab section has on average about 20-22 students and the coordinator is responsible for ensuring that all the prepping is done and all materials set out ahead of time. All instructors and the coordinator meet once a week to discuss the exercise of the week, which also includes a "vocabulary quiz." Students sometimes work alone, other times, depending on the nature of the exercise, in groups. Exercises are geared toward applying knowledge learned in the lectures and include a significant amount of measurements, data collection, concept of mathematics and scientific writing throughout the semester. In short, there are plenty of opportunities for students to work together on inquiry-based problems. (An example syllabus is presented in Appendix C.) This is not the case, however, in General Biology II labs. For this reason, Biothrust 21 will focus on General Biology II labs rather than General Biology I labs.

The General Biology II laboratory course is a freshman/sophomore level course required for all biology, chemistry pre-med, psychology pre-med, and pre-pharmacy majors. In a typical semester approximately 420 students are enrolled. The course currently consists of a series of single week laboratory exercises that emphasize neurobiology, anatomy and physiology, genetics, and molecular genetics. At least half of the exercises are "dry" labs that do not require usage of the scientific method. "Wet" labs are instructor guided and students follow a step-by-step protocol to achieve pre-determined outcomes. Typically, this results in students with little or no understanding of the overall concept being studied. Thus, to provide students with a strong foundation in current methodology and to fully engage them in the scientific method, the general biology II laboratory course will be redesigned in such a manner that the overall content is not changed but the manner in which it is presented is enhanced. Our goals are to:

- Expose students to current and/or relevant scientific techniques;
- Require students to analyze data and formulate accurate and/or alternative explanations;
- Enhance communication skills;
- And to increase students' interest in biological science research.

To accomplish these goals, an interdisciplinary inquiry based course utilizing multi-week case-based laboratory exercises will be developed. Each exercise will consist of case/scenario

problems developed by organizations such as the Association of Biology Educators, National Association of Biology Teachers, and texts such as Biological Inquiry. These materials will be rigorously assessed and then integrated and adapted to meet instructional needs. Over the course of the semester, the laboratory exercises will progress from guided inquiry where the instructor provides both the question and the means for obtaining and evaluating the answers, to open–inquiry where students play a greater role in the design, test, and evaluation process.

The General Biology II laboratory will be divided into four multi-week lab exercises. At the beginning of each exercise, students will be provided materials, hard copy and on-line, containing the case scenario, discussion of techniques and associated information, protocols, a pre-lab assignment, and the presentation form for results. Pre-lab assignments will consist of 5-10 questions that query students understanding of theories and concepts associated with the lab, details of techniques to be utilized, calculations, and data analysis. Answers to the pre-lab will be discussed during the pre-lab lecture. Laboratory notebooks will be maintained on-line allowing sharing of data between all class members. Results shall be presented in the form of a research paper or oral presentation depending on the module.

Exercise 1 will be completely instructor guided. It will be utilized to familiarize students with the process and expectations associated with an inquiry based laboratory course and with techniques, such as pippeting, common to all modules. In Exercise 2, students will investigate, quantitatively and qualitatively, the touch sensory function of the skin. Values obtained using the two-point discrimination test will be used to map the somatosensory cortex, to estimate the density of receptors, and to assess the plasticity of the brain in reference to adaptation. This module will require the understanding and utilization of biological and mathematical concepts.
In exercise 3, "Why Did Mr. and Mrs. Piggy Die?" Students will dissect six-week-old fetal pigs and will compare normal anatomy to instructor provided abnormal organs. Enzyme analysis of instructor provided serum and gastric enzymes will be conducted to determine if death resulted from myocardial infarction or gastric ulcer perforation. This module will require the understanding and utilization of biological, chemical, and mathematical concepts. In module 4. students will investigate the effect of various chemical pollutants on the development of freshwater sponges. Genes associated with various developmental defects will be amplified via PCR and sequenced. Sequence analysis will be conducted using web-based technology. This module will require the understanding and utilization of concepts from the disciplines of genetics, molecular genetics, and bioinformatics.

Initially, the newly developed labs will be taught in only one section and results of student performance will be compared to that from other, more "traditional labs." In addition, student feedback in the form of formal student evaluations (administered by the university) and surveys specially developed in conjunction with CAT will serve as additional assessment tools. Based on the student feedback and performance, the Biology 2010-based newly developed exercises will be included in all sections over time.

❖ **Microbiology lab** - Currently, the Microbiology lecture and laboratory course enrolls students typically in their second year of undergraduate education. The lecture is a 3 credit hour course while the lab is a 1 credit hour course. The faculty load for the Micro lab is 2.25 hours

and it meets once a week for 2 hours and 50 minutes. As one would expect from its reputation for excellence in science education, the university invests a significant amount of resources in all of its lab courses and Microbiology lab is no exception. Resources include state-of-the art microscopes (currently all new, purchased by the generous funding from the Howard Hughes Medical Institute), monitors and AV equipment for projecting magnified images from the scopes, walk in cold rooms, two large and two bench-top autoclaves, spectrophotometers and stationary and shaker refrigerated incubators that can be set at different temperatures. The lab exercises include wet labs where students get to learn varied microbiological skills using aseptic techniques and also conduct diagnosis-focused experiments where results have to be recorded and analyzed the following day. Scheduled sections contain on average about 21 students so as to maximize teacher-student interaction and personal attention. The lab coordinator is responsible for preparing and aliquoting each day, fresh microbial cultures for each section. The exercises have been carefully designed to closely follow the topics covered in lecture since almost all students who take the lab also take the lecture and they have been selected to further students' career goals. Lastly, the assessment includes an extensive, interpretation based, 'practical' exam, 'skills' exam (example Gram staining) and written portions including a detailed lab report. In short, students have to work very hard to earn their one credit for this course. The lab manual used is the one internally authored initially by Dr. Joseph Ross and last revised in 1996 by Dr. Shubha Ireland with the support from Xavier's Center for the Advancement of Teaching. **Modifications to existing exercises and possible new Microbiology laboratory exercises are described in Appendix D**.

Since the revisions/new exercises for the Micro lab will be applied to all sections, all instructors of the course will include a certain agreed upon % of questions on the new portions. In addition the quizzes will also contain 30% more number of questions, which will be based on calculations (example for viable counting, growth curve) or interpretations or applications (example unknown organism giving 'xyz' results on known media, what might be its identity etc). Then, item analysis will be performed on those questions and results analyzed with respect to the newly introduced and/or expanded exercises. The control will serve as questions testing the knowledge of existing (non-revised exercises). In addition, student feedback in the form of formal student evaluations (administered by the university) and surveys specially developed in conjunction with CAT will serve as additional assessment tools.

B(1)c Providing more effective feedback mechanisms that will allow instructors to better gauge student understanding of course content both in and out of class

❖ **In-class feedback - Electronic Personal Responders** - When teaching large classes such as General Biology, it is difficult to know what students understand and what they do not. This will be addressed by obtaining direct, in-class feedback from students through electronic Personal Responders. Students are posed a question, given a small amount of time, and then asked to click the answer on their electronic responder. Instantaneously, a graph is projected onto a screen in front of the classroom that shows the distribution of student answers. The instructor can then further explain the topic or move on depending on the answers given. In addition to providing instructor feedback, this tool also increases student attentiveness and engagement during class. Personal responders can also be used to give in-class quizzes and individual student

grades can be transferred quickly to the instructors Blackboard Grade book, a technology already widely used at Xavier.

❖ **Out-of-class electronic feedback systems** - At present, most of the homework questions in general Biology I modules are available online, using Blackboard, as an electronic quiz containing randomized questions with immediate scoring (correct vs. incorrect) of the student's answers. On any given question, the student has the opportunity to choose answers repeatedly until the correct answer is chosen. General Biology I homework questions not yet available on line and all of General Biology II homework questions will be made available online using Blackboard.

❖ **Out-of-class electronic testing systems** - When combined with sets of test pool questions generated with electronic testing software such as Respondus or Lock-Down Browser, Blackboard also can be used for the administration of graded quizzes and exams. Such an option could relieve faculty of having to grade closed ended test questions and allow them more time to focus on providing feedback for open-ended questions. With Biology faculty, Office of Academic Enhancement and Tutoring Center staff will explore the possibility of developing a secure, proctored environment for quiz and exam administration utilizing such software.

B(1)d Enhance tutoring, technical writing, mentoring and advising support systems for students in their first two years of Xavier's Biology curriculum

❖ **Enhance Tutoring Center** - Xavier's Biology Tutoring Center is available 20 hours during a week for students having problems. However, it is increasingly under-utilized, particularly by those who would benefit most from using it. There appear to be a variety of reasons for this including: shyness which prevents students from seeking help; denial, whereby students are simply unrealistic about their performance; and, in some cases, the schedules of the student and the tutoring center simply conflict - whenever the tutoring center is open, the student is in class. To address these challenges:

- Attendance at the Tutoring Center will be made mandatory for those students who are at-risk of failure, that is, those with less than a 75% average on quizzes and exams.
- Tutoring Center hours will be expanded and be open at least two evening per week.
- General Biology instructors will hold 2 of their 6 office hours per week in the tutoring center,
- A coordinator of Biology tutoring will be hired who will: select student-tutors, arrange their working schedules and keep accurate record of their attendance; provide workshops for tutors and set up demos at the tutoring-center computer stations for animations and web-based resources that often can not be covered in class due to time constraints; hold review sessions for groups of students; assist the head of the Dean of Freshman Studies/head of the Office of Academic Enhancement (see section below) and the Chair of Biology in 'tracking' subpopulations of students (e.g. group A--very high ACT/SAT scores, no remedial courses, have AP credits; group B--good ACT /SAT scores but not great, no developmental courses; group C--below average ACT/SAT scores, at least one developmental class.) This will provide an important tracking and assessment tool and help establish the correlation between specific developmental courses (such as reading or writing) and their overall grasp of Biology concepts; teach one section of General

Biology I and General Biology II so he/she has first hand knowledge of what is being covered and the challenges associated with the courses; hire, train and supervise outstanding junior and senior biology majors who will serve as tutors for the Biology Tutoring Center.

❖ **Technical Writing** - The science writing skills of Xavier's students need to be greatly improved. Most of Xavier's freshmen have had basic high school science courses (biology, chemistry, physics, earth science, etc), but development of scientific writing was not part of the skills they were taught. Many students were never assigned a lab report or asked to analyze or interpret data derived from hands-on experiments. Yet, for these students to have a high probability of succeeding at Xavier and entering successful careers, they must have good scientific writing skills. The essential ingredient to improving writing skills is *feedback*. It is an iterative procedure in which assignments are turned in, corrected by the instructor, and turned back to students to be rewritten. The procedure is repeated as many times as necessary until an acceptable product is achieved. Assigning written lab reports on open ended problems requiring analysis and inference can be an excellent opportunity to provide instruction on technical writing. However, undergraduate biology lab instructors are typically assigned several lab sections each semester. The teaching of scientific writing skills, even if it is a stated objective in a lab course is only one of many objectives or skills that must be covered. Grading lab reports is a tiresome and tedious task even for the 25-28 students in a single lab section. Multiply this times the three to four lab sections per semester an instructor is typically assigned and the use of the lab report as a skills development tool becomes unmanageable. Similar challenges occur in basic biology courses where many professors no longer ask essay or even short-answer questions on exams.

To begin to address these issues, a faculty member who can teach technical writing will be hired and assigned to the Tutoring Center. This individual will:

- Implement a portfolio approach in the Tutoring Center. [20,21] A portfolio will be created for each student and include student lab reports and other writing examples. These samples will be saved for later use in writing workshops. The Portfolio also will include a document that summarizes the student's skills, and outlines tasks linked to programmatic learning goals. Portfolios will require all students to attain acceptable skill levels and provide a mechanism through which the student can interact with faculty. It also will provide an excellent device for program, course and curricular assessment.
- Provide scientific writing workshops at which attendance will be required. The writing workshops will use examples of student writing saved in a student's "portfolio", and will provide students with exercises in recognizing and improving their writing mistakes.
- With Xavier faculty, Co-teach selected lab modules in General Biology I and II that will emphasize full, written reports and on which students will get substantial feedback.

❖ **Mentoring/Advising:** Since its founding, Xavier University has made academic advising anintegral component of its academic programs. This strong emphasis has played a key role in the success of Xavier students. A variety of studies on academic advising have shown that frequency and perceived worth of student interaction with faculty outside the classroom enhances student success. [8, 12, 20] At Xavier, each student is assigned an academic advisor in

his/her major department. Biology faculty make themselves available approximately 6 hours per week to meet with students. In addition to posting office hours on their doors, biology faculty members typically have an "open door" policy.

Freshmen receive advisor cards. On these cards, they self-report their grades and have their advisor sign them weekly. This practice has a number of benefits for the students. It allows early intervention if a student is experiencing academic difficulty. Faculty can give the student tips on good study skills and time management. They can also direct the student to areas where they can receive assistance. At the same time this practice gives the student an adult that he/she can feel safe to go to if a problem does arise. This also gives the shy student who might get lost on a college campus, a reason to meet with a faculty member. Many would never do so without the necessity to have their advisor cards signed.

While the Biology Department's student-advising program has been very effective over the years, we face many challenges. Prior to Katrina there were more than 1,400 biology majors. That number is now down to under 900, however, it is expected to begin increasing once again next year. This year, the advisee/faculty ratio ranged from about 25 (minimum) to about 80 (maximum) per faculty. A tremendous amount of "bookkeeping" activities are required of faculty advisors that are extremely time consuming. Furthermore, General Biology instructors will hold 2 of their 6 office hours per week in the Tutoring Center.

Currently, Xavier Biology faculty members teach 12 credit hours and have 3 additional contact hours in their lab sections. At a time when we will be asking faculty to take on significant additional responsibilities in upgrading the effectiveness of the first two years of our Biology curriculum, we believe it is critical to have some of these more routine duties transferred from a faculty to a staff member. To this end, we will hire an Assistant Coordinator of Advising to:

- Update folders of Biology Majors each semester: These folders are prepared for each student and contain the student's academic data sheet, summary sheet, transcripts (for transfer students), registration information, as well as, all pertinent letters, permissions, etc.
- Prepare for preregistration of incoming freshmen: Incoming freshmen are prescheduled during the summer prior to their entrance to Xavier. The assistant coordinator of advising will prepare template schedules in which faculty previously had to enter the class codes check academic data sheets, etc.
- Prepare transcript evaluations for exit interviews of juniors: the assistant coordinator now will complete the forms, previously summarized by faculty members. Faculty still will meet with each junior advisee to go over the information.

In addition, the assistant coordinator will explore and pilot test integrating activities, such as co-registering small group of students in the same classes for the first year to form dedicated study groups/learning communities and to discourage compartmentalization of information.

This effort will be greatly assisted by a new office the University has agreed to launch in conjunction with this project, namely, the Office of Academic Enhancement (AcE). A "Dean of Freshman Studies" who will be hired based on a national search will head AcE. The AcE Office will provide each student with essential information and a wide range of resources designed to

assist, reinforce, and enhance the Xavier learning experience and retention rates, as well as support movement toward future career and post-graduate choices. AcE will assist Biology faculty by: more closely monitoring the academic progress of students, especially Freshmen and probationary students; identifying and mentoring faculty, both inside and outside the biology department, who have interest and skill in advising students who face academic challenges; and forming a collaborative, cross-departmental group who can share information and provide mutual support. AcE also will provide oversight and assessment of the Biology and other departmental tutoring programs with respect to policies, hours, hiring, non-duplication, etc.

B(1)e Facilitating course/lab revision and innovation through the use of Xavier's Center for Advancement in Teaching

Xavier's Center for the Advancement of Teaching (CAT) will work closely with Biology Department faculty members engaged in this PKSFI project to assist them in the redesign and development of course and laboratory instructional modules as well as outcome assessment strategies. CAT staff members are committed to fostering effective teaching and deep and lasting student learning, and to the University's mission of building a more just and humane society. In so doing, it promotes a nonjudgmental, safe, collaborative, and supportive environment for faculty to experiment, learn about pedagogy, think and work in creative and diverse ways, and explore all aspects of faculty development.

Since 1997 this highly successful program has enabled over 80 faculty members from across the disciplines to reflect on and re-design their courses. 13 of these projects involved faculty in the Biology Department who were working on courses such as: Cell Biology, the Neurochemical Basis of Human Behavior (both by Dr. Royal Saunders), Anatomy and Physiology (Dr. Chris Doumen), Genetics (Dr. Todd Stanislav), and Introduction to Forensic Sciences (Dr. John Eckert). Faculty involved have set out to answer questions such as: Is the standard set for material that students are expected to master too high, or are students insufficiently learning and studying course material? How can one lead students to make connections between terminology and lab activities? How can students be motivated to spend sufficient time doing activities during lab? How can students be better prepared to discern material to study outside of class? How can students learn material for a duration long enough to be prepared for exams? These investigations resulted in changes in approach and improvements in, for example, homework assignments, study guides, lab overheads, quizzes, computer simulations, Power Point presentations, and lab handouts. New assessment strategies also were implemented, beyond simply comparing grades. Participants in the Course Portfolio project made use of 24 different assessment tools (a complete list, with links to projects, is available on the CAT website: http://cat.xula.edu/toolbox/tools (See Appendix E.)

As a result of an extensive strategic planning process involving outside, consultant experts, we concluded that the work of CAT could be significantly enhanced by adding an assessment specialist to our staff. This individual would assist faculty in gauging higher-level critical thinking skills in their courses through a variety of unique, innovative evaluation techniques and, thereby, provide assessment models within departments. Our goal, ultimately, is to make Xavier not only a national center of excellence in graduating scientists but also in assessing higher-level scientific critical thinking and learning.

During the years covered by the PKSFI grant, this Assessment Specialist will devote half of his or her time and energies to this project, helping to design an assessment plan that gauges how well learning goals are being met. He or she will work closely with the PKSFI Project Evaluator and with the Course Portfolio Working Group Leader, leading faculty through a process of (1) reflecting on the learning process in Biology, (2) developing a philosophy of teaching, (3) investigating what it means to "think like a scientist" in Biology courses, (4) reviewing state-of-the-art assessment methods in science instruction, (5) revising targeted Biology labs to make them more experiential and demanding of higher-level critical thinking skills, (6) creating a plan for and instruments of evaluation, and, finally, (7) conducting the evaluation.

B(1)f Internships in local biosciences industry and laboratories

Xavier already actively places student interns in bioscience labs at Tulane and LSU Health Science Centers as well as the USDA's Southern Regional Research Center in New Orleans. Typically, students and faculty are funded through collaborative federal grants acquired by the universities involved. This program will be enhanced and expanded to New Orleans Bioscience companies. As previously described, over the last three years through Greater New Orleans (GNO) Inc., New Orleans bioscience companies have forged a strong relationship with the city's universities, particularly LSU Health Sciences Center, Tulane and Xavier. In order to more effectively address work force goals, PKSFI/Xavier Biothrust 21 will work with the Biosciences Committee of GNO Inc. to develop a biosciences internship program for Xavier, and ultimately other university students. (See letter of support in Appendix F.) Xavier's Sr. Vice President for Resource Development has worked closely with GNO Inc. to carry out Bioscience studies of the region and to develop and pass legislation that will attract to and grow the bioscience industry in the greater New Orleans metropolitan area. A registry of internship opportunities will be developed in cooperation with bioscience companies and Xavier's Placement Office. The University's Center for Undergraduate Research will identify and encourage students who would like to participate in such internships and broker matches. Students will initially be supported by stipends from the Biothrust 21 grant and, as the program grows, supported by the companies themselves and/or gifts and grants. Student and business feedback will be gathered through questionnaires and be reviewed twice a year by the GNO inc. Biosciences Committee. In addition, longitudinal data will be gathered to determine the extent to which student interns actually are offered and take positions in bioscience labs or businesses in New Orleans or Louisiana.

It is anticipated that the above-described iterative process will not only increase the bioscience labor pool, but also lead to revisions of existing courses/curricula as well as the creation of new courses/curricula that will better serve New Orleans' bioscience labs and industry.

B(2) Project Structure

Shubha Kale Ireland will be the Principle Investigator and Project Director for PKSFI/Xavier Biothrust 21. A working group consisting of faculty and staff responsible for each of the components in this project will meet twice a month to review project progress, share observations and information and make adjustments as necessary.

An internal task force will be formed, chaired by Dr. Marguerite Giguette, Associate Vice President for Academic Affairs. This group will include: the new Dean of Freshman Studies/head of the Office of Academic Enhancement, Dr. Gene D'Amour, Sr. Vice President for Resource Development, and Dr. Harold Vincent, Dean of the College of Arts and Sciences. The purpose of this group will be to assist in:

- Overcoming institutional barriers faced by the project;
- Coordinating project activities with retention/student support activities being undertaken outside the Biology Department;
- Assure internal dissemination of strategies developed and lessons learned, and;
- Actively garner additional external resources to enhance and expand project activities.

A small external advisory committee will be established to include:
Dr. Willie Pearson, Jr., the Chair and Professor in the School of History, Technology and Society at Georgia Institute of Technology, whose research has centered on the career patterns of Ph.D scientists, particularly African Americans, and human resource issues in science and engineering. Dr. Isiah Warner is the Howard Hughes Medical Institute Professor, Vice Chancellor for Strategic Initiatives and Boyd Professor at Louisiana State University. Drs. Pearson and Warner co-authored a chapter of Diversity in Higher Education: Volume III entitled, "Mentoring Experiences of African American Ph.D. Chemists."

This committee will meet twice a year and be staffed by the Offices of the Academic Vice President and Sr. Vice President for Resource Development as well as the project evaluator. The group will focus on project milestones and outcomes assessment and advise the project director on problems that arise and how they might be addressed.

B(3) Project Impact
Currently, 70% of the students in Biology I and II have Ds and Fs at midterm. Our first tier goal is to decrease this percentage to 35%. Similarly for Microbiology, we intend to decrease midterm Ds and Fs from 45% to 30%. Simultaneously, we will increase overall student–performance by decreasing withdrawal rates and improving Class GPAs. Our ultimate goal is to increase retention by 30% or more for each 1st and 2nd year class compared to the current numbers. Over time, we expect to achieve a retention rate of 75% or higher. In achieving this Biothrust 21 retention goal, the number of African American Biologists graduating each year and available to the New Orleans Biosciences industry in New Orleans and Louisiana will increase to approximately 350 per year. These students will be more analytical, more quantitatively oriented and better able to address the challenges of 21st century biology. They also will be better technical writers and, because of the Biosciences internship program, more likely to take a position in New Orleans or Louisiana.

B(4) Performance Measures and Milestones
The program evaluation will provide a formative (process) and summative (outcome) evaluation of all program goals and related activities of the proposed PKSFI grant. The proposed program evaluation follows the organization of the program strategies designed to support the goals and objectives of the Biothrust 21. This evaluation will be conducted following the standards established by Joint Committee on Standards for Educational Evaluation. [8] Reports will be provided to the Program Director for each semester and on an annual basis

B(4)a Formative Evaluation: Formative evaluation is typically conducted during the development or improvement of a program. The preliminary formative or process evaluation to develop this proposal was conducted by the Academic Vice President and A & S Dean's Offices and the Chair and key faculty members of the Biology Department who will be responsible for carrying out program strategies, as well as key personnel from Xavier's Office of Resource Development, and personnel assigned as evaluators of the program. All activities of the program will undergo continual process evaluation using student attendance, data from program and biology department activities and responses to program evaluation measurement instruments. In general the evaluation design is a pretest – intervention – posttest design. The pretest data are the baseline course grade point averages for first and second year Biology classes for the three post-Katrina semesters as shown in the trend data presented earlier. The intervention is the proposed grant, and the posttest data are the overall course grade point averages (GPAs) for first and second year Biology classes each year during the intervention and in summary (cumulative for all years) at the end of the PKSFI grant period. Formative evaluation will be an ongoing process through the entire grant period in order to adjust for unexpected implementation situations and unexpected outcomes. Future program components may be adjusted both positive and negative unanticipated outcomes. Whenever possible existing departmental and university data will be used, including demographic data about each student. Web-based data collection will be emphasized, and web-based data sets will be maintained.

B(4)b Summative Evaluation: Summative evaluation will focus on evaluation of the specific program activities by measuring student outcomes related to the activities. Outcome measurement will be used to determine: (1) "Was the stated goal or objective met by the program activities?", (2) if met, "What is the extent to which the goal or objective was met?" and (3) "What is the overall impact of the goal or objective on the University?"

The summative evaluation will examine group data (overall course grades) for Biology classes each year and for the overall grant period to compare to the pretest data. Whenever possible assessments of individual grant components (i.e., tutoring center attendance, "clicker" participation, quizzes, exams etc.) will be correlated with overall course grades to analyze their specific effects on outcomes. By analyzing assessments of individual grant components learning outcomes related to specific materials and methods can be evaluated. In the correlational analysis bivariate correlations will be calculated, and for significant correlations, regression equations will be calculated. If feasible, a multiple regression analysis will be conducted that examines the relative contribution of individual grant components to overall course grades. Additionally, outcomes for courses and course components may be examined for their relationship to overall Senior Comprehensive Exam scores and specific, related questions from the comprehensive exams. Whenever possible, outcomes may be correlated with GRE and MCAT scores. Student writing data will provide repeated measurement of writing ability to see if writing improves over time. In the summative evaluation group data will be used to assess learning outcomes; however, advisors may find it useful to analyze individual student data to assess individual student outcomes and to plan remediation.

B(5) Sustainability and Scalability
B(5)a Sustainability

Biothrust 21 is critical to Xavier being able to maintain it's national prominence in the Biosciences. The University is fully committed to sustaining the activities of this project as PKSFI support ceases. As can be seen in the Biothrust 21 budget, the University is committing significant resources to this project and PKSFI support is decreased as the project moves into the later years of the grant.

B(5)b Scalability

The new Dean of Freshman studies/head of the Office of Academic Enhancement will assure dissemination of project results internally to other STEM departments and ensure that the efforts outlined in this proposal are sustained. The Dean of Freshman Studies also will be actively involved in the Internal Advisory Committee.

As an NSF Model Institute of Excellence, Xavier is already actively involved in, and funded by NSF, to disseminate components of its curriculum. Our goal is to provide other universities the tools and resources necessary for implementation of selected components of the Xavier STEM model at their home institution. A second goal is to provide a national audience interested in transforming STEM climates to be inclusive to minority students. Xavier's efforts have focused on curriculum reform/development, faculty development and undergraduate research. Several approaches are being used to disseminate information including: participation in national and local dissemination conferences; publications in journals; faculty presentations at national conferences and the distribution of brochures and CD-ROMs. Biothrust will use these same successful methods to disseminate strategies, materials and technologies developed. (A description of a sample dissemination conference sponsored by Xavier is attached in Appendix G. It describes the organization of the conference, the activities undertaken, sample results and how they impacted other institutions.)

C. Leverage of Resources

There are three ways in which PKSFI/Xavier Biothrust 21 will leverage resources, both internal and external. First, the University is committed to making a significant investment in personnel, space and materials to launch the new Office of Academic Enhancement. As previously mentioned, this will consolidate and coordinate all of the University's retention and advising programs. Second, the University has three major NIH and NSF grants focused on retention and education of students through involvement in research (MARC, MBRS-RISE, and HBCU-UP). The faculty engaged in Biothrust 21 are also actively involved in these NIH and NSF grants and they and the new Dean of Freshman/Office of Academic Enhancement will assure a synergistic and catalytic relationship among these projects. Finally, the excellent laboratory and instrumentation infrastructure obtained in the last 3 years from NIH ($3M for vivarium), Sherman Fairchild and Mott Foundations ($1M for equipment and core molecular facility), Lilly Foundation ($.5M for Greenhouse), Howard Hughes Medical Institute ($1M for Biology research equipment), and Pfizer ($.6M for 600mg NMR) will be fully used by students involved in Biothrust 21. In addition, the state-of-the-art core facilities of the Tulane/LSUHSC Louisiana Cancer Research Consortium (LCRC) have been made available for use by Xavier faculty, many of whom are members of this consortium and adjunct faculty at Tulane.

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BOARD OF REGENTS SUPPORT FUND
POST-KATRINA SUPPORT FUND INITIATIVE, FISCAL YEAR 2006-07

BUDGET
PROJECT YEAR (CIRCLE ONE):
1 2 3 4 5 (√) Composite

Title of Proposed Project: PKSFI/Xavier Biothrust 21: Rebounding from Katrina and Producing a Larger, Better Prepared 21st Century, Biosciences Workforce for Louisiana

Principal Investigator(s): Dr. Shubha Kale Ireland

Institution(s) of Higher Education: Xavier University of Louisiana

I. PROPOSED BUDGET:

	Support Fund Money Requested*	Institutional Match**	Private Sector/ Other Match***
1. Research Salaries	$1,107,003.00	$ 728,485.00	$
2. Clerical Salaries	$		
3. Subtotal	$1,107,003.00		
4. Fringe Benefits (% of A.3)	$ 185,657.00		
5. Graduate Asst.			
6. Student(s)	$ 111,600.00		
7. Endowment(s)****			
8. Subtotal A	$1,404,260.00	$	
B. Supportive Expenses:			
1. Travel	$ 40,000.00	$	
2. Supplies	$ 15,000.00		
3. Consultants			
4. Rentals			
5. Printing	$		
6. Equipment	$ 14,525.00		
7. Other Expenses (Identify) Printing, Paper, Faxing, Conference Calls etc.			
a.	$ 14,000.00		
b.			
8. Subcontracts			
9. Subtotal B	$ 83,525.00	$	
C. Overhead:			
1.	NOT PERMITTED	$ 1,055,405.00	$
2. **Other Funded Projects that will support this proposal**		**$ 6,000,000.00**	
TOTAL PROJECT COST:	$1,487,785.00	$ 1,783,890.00	$ 6,000,000.00

*In the budget justification, distinguish between funds requested from the P-KSFI principal program and the Enhancement for Severely Impacted Institutions (ESIP). Note that ESIP funds may be used only at the institutions listed in Appendix A of this RFP.

**Stipulate whether in-cash or in-kind.

***The budget page(s) must reflect and the budget justification page(s) must explain any external funds that are claimed in the proposal. These funds must be itemized and their expenditure accounted for in the same manner as Support Fund money and institutional match. Refer to Section III.G of this RFP for details on matching requirements.

****Matching funds for the endowment of chairs may be requested through P-KSFI, though such requests must adhere to all regulations governing the BoRSF Endowed Chairs for Eminent Scholars Program.

Please see appendix I for detailed budget and budget narrative

APPENDIX A:

Schedule of Activities

		Revise General Biology Courses		Revise Labs		Provide Enhanced Feedback Mechanisms		Enhance Student Support Systems			Biosci Industry Internship	Evaluation	Dissemination
		Course Modules Gen Bio I & II	*Instructors Guide*	*Biology II*	*Microbiology*	*Personal Responders*	*Electronic Testing Assessment Systems (ETA)*	*Tutoring Center Coordinator*	*Tutoring Center Technical Writer*	*Student Advising*			
	Individuals responsible (group head listed first)	Carmichael, Labat, Bandaranayake, Boissiere, Ratanayaka	Carmichael Labat	McKinney	Ireland, Ross	Carmichael Labat	Carmichael Labat	Carmichael, Labat, Dean of Freshmen Studies	Martinatl, Carmichael, Dean of Freshmen Studies	Carmichael, Labat, Dean of Freshmen Studies	D'Amour, Donaldson	Brookover, Lanou	Ireland, Labat, Dean of Freshman Studies, McKinney & D'Amour
Year													
Year 1	**Summer '07**	Revise & restructure General Bio. I & II	Develop guide for first half of Gen. Bio I & II	Design new exercises	Revise existing exercises	Purchase Personal Responders (PR)				Launch Office of Academic Enhancement; Begin search for Assistant Coordinator for Advising	Meetings with Bioscience companies to develop internship program.	Evaluation tests identified or developed for each program component	
	Fall '07/'08	Implement & test in Gen. Bio I; begin review of new text	Implement and test in Gen. Bio. I		Review literature to identify new exercises	Pilot test PR in 1230 ; 1 test, 1 control section		Begin search for coordinator of Tutoring (CT)	Begin search for Asst. Coordinator (ACT) - technical writer instructor	Hire Assistant Coordinator for Advising; Begin providing assistance to faculty advisors	Internship program design developed and finalized	Evaluation data gathered	
	Spring '07/'08	Implement and test in Gen Bio II; continue review and choose new text.	Implement & test in Gen. Bio. II	Implement & test new exercises in 1 section with 1 control section	Implement & test revised exercises in all sections; continue literature review	Pilot PR in 1240 ; 1 test, 1 control section		Hire CT	Hire ACT technical writer instructor	Continue assistance to Biology faculty advisors.	Internship program implemented	Evaluation data gathered	
Year 2	**Summer '08**	Revise Modules based on evaluations; add Bio 2010 content	Revise first half of guide based on evaluations; develop second half	Revise exercises based on evaluations;	Revise existing exercises base on feedback & evaluation; Develop new exercises	Revise use of PR based on feedback and evaluations	Faculty identify ETA Systems to be explored	New CT begins to identify or develop instrument & method for selecting and evaluating successful student tutors	New ACT begins developing technical writing workshop and integrating tech. writing into labs	Continue assistance to Biology faculty advisors.	Program revised based on evaluations & feedback; programmatic materials developed for students	External review of program design and of each component; revision of evaluation strategy & tests for each component	
	Fall '08/09	Implement revised modules and new text in Gen. Bio I.	Implement revised guide in Gen. Bio. I	Implement exercises in all sections		Implement PR in all sections of Gen. Bio I & II	Faculty Explore use of ETA Systems chosen	CT tests new instruments & methods on tutors	ACT begins integrating tech. writing into labs, launches workshop, begins portfolio approach.	Continue assistance to Biology faculty advisors.	Revised program implemented	Evaluation data gathered	
	Spring '08/'09	Implement revised modules and new text in Gen. Bio. II.	Implement revised guide in Gen. Bio. II	Implement in all sections	Implement new & revised exercises in all sections	Implement PR's in all sections of Gen. Bio. I & II	Faculty Explore use of ETA Systems chosen	CT tests new instruments & methods on tutors	ACT begins integrating tech. writing into labs, launches workshop, continues portfolio approach.	Continue assistance to Biology faculty advisors.	Revised program implemented	Evaluation data gathered	

Year 3	**Summer '09**	Revise based on evaluations & feedback	Revise guide based on evaluation and feedback	Revise exercises based on feedback & evaluation	Revise exercises based on evaluation & feedback	Develop training package and train faculty to use Personal Responders (PR's)	Recommendation made ETA Systems to be used.	CT revises instruments based on evaluations; develops training materials.	ACT revises workshops and lab materials	Continue assistance to Biology faculty advisors.	Program and program materials revised as needed	External review of program design and each component	
	Fall '09/'10	Continue implementation & testing	Implement revised guide in Gen. Bio. I	Continue implementation		Make PR's available for use in all Biology courses	ETA Systems implemented in one course, as appropriate	CT tests training modules; hires additional tutors; expands Center hours	ACT test lab materials and workshops; continues portfolio approach.	Continue assistance to Biology faculty advisors.	Revised program implemented	Evaluation data gathered	
	Spring '09/'10	Continue implementation & testing	Implement revised guide in Gen. Bio. II	Continue implementation	Continue to implement exercises	Make PR's available for use in all Biology courses	ETA Systems implemented in one course, as appropriate	CT tests training modules; hires additional tutors; expands Center hours	ACT test lab materials and workshops; continues portfolio approach.	Continue assistance to Biology faculty advisors.	Revised program implemented	Evaluation data gathered	
Year 4	**Summer '10/'11**	Review component as part of overall program impact and revised as necessary. Prepare dissemination materials.	Review component as part of overall program impact and revised as necessary. Prepare dissemination materials.	Review component as part of overall program impact and revised as necessary. Prepare dissemination materials.	Review component as part of overall program impact and revised as necessary. Prepare dissemination materials.	Review component as part of overall program impact and revised as necessary. Prepare dissemination materials.	ETA Systems use evaluated and integrated across components as appropriate	Begin integrating 1240 lab reports into blackboard; Revise strategies & materials based on evaluations. Hire Y additional tutors & fully implement program	Review component as part of overall program impact and revised as necessary. Prepare dissemination materials.	Review component as part of overall program impact and revised as necessary. Prepare dissemination materials.	Review component as part of overall program impact and revised as necessary. Prepare dissemination materials.	External and internal review of overall program impact	Dissemination strategies developed
	Fall '10/'11	Continue implementation	Continue implementation	Continue implementation	Continue implementation	Continue implementation	ETA Systems extended to other courses as appropriate	Hire Y additional tutors & fully implement program		Continue implementation	Continue implementation	Evaluation data gathered; research on dissemination strategies	Dissemination strategies communicated to faculty
	Spring '10/'11	Continue implementation	Continue implementation	Continue implementation	Continue implementation	Continue implementation	ETA Systems extended to other courses as appropriate			Continue implementation	Continue implementation	Evaluation data gathered; research on dissemination strategies	Faculty develop component dissemination materials
Year 5	**Summer '11**	Prepare dissemination materials	Prepare dissemination materials	Prepare dissemination materials	Prepare dissemination materials	Prepare dissemination materials	Prepare dissemination materials	Continue implementation		Prepare dissemination materials	Prepare dissemination materials	Prepare dissemination materials	Integrated dissemination package prepared.
	Fall '11/'12	Continue implementation & Disseminate strategies & materials	Continue implementation & Disseminate strategies & materials	Continue implementation & Disseminate strategies & materials	Continue implementation & Disseminate strategies & materials	Continue implementation & Disseminate strategies & materials	Continue implementation & Disseminate strategies & materials	Continue implementation		Continue implementation & Disseminate strategies & materials	Continue implementation & Disseminate strategies & materials	Continue implementation & Disseminate strategies & materials	Dissemination activities & conference
	Spring '11/'12	Disseminate strategies & materials	Disseminate strategies & materials	Disseminate strategies & materials	Disseminate strategies & materials	Disseminate strategies & materials	Disseminate strategies & materials			Disseminate strategies & materials	Disseminate strategies & materials	Disseminate strategies & materials	Dissemination activities & conference
								Prepare dissemination materials					
								Continue implementation & Disseminate strategies & materials					
								Disseminate strategies & materials					

APPENDIX B:

General Biology Module

STUDY GUIDE FOR MODULE V
ENERGY RELEASING PATHWAYS AND ATP SYNTHESIS

LEARNING GOALS

After studying the assigned sections in the text and working the homework required in this module, you should be able to:

1. Review the need for energy in cells.
2. Define the terms aerobic respiration and anaerobic respiration.
3. Write the summary reaction/equation for the complete respiration of glucose, list the names of the 4 stages of aerobic cellular respiration, and define the terms decarboxylation reaction, dehydrogenation reaction and preparatory reaction(s).
4. Describe glycolysis. Include its universality, location in the cell, gas requirement, summary reaction/equation, energy investment and energy capture phases, ATP production (substrate-evel phosphorylation), and review the role of NAD^+.
5. Define the term substrate-level phosphorylation.
6. Describe the conversion of pyruvate to acetyl CoA. Include the summary reaction/equation, location in the cell, and NADH yield, and define the term oxidative decarboxylation reaction.
7. Describe the citric acid cycle (Krebs cycle, TCA cycle). Include the summary reaction/equation, location in the cell, and yield of ATP, NADH, and $FADH_2$.
8. Define electron transport system. Give location in the cell, the role of electron carriers (NADH and $FADH_2$), and the role of O_2.
9. Name and describe the process that uses an H^+ gradient across the inner membrane of the mitochondrion in order to generate ATP.
10. Define the term oxidative phosphorylation.
11. Summarize the overall process of aerobic respiration, including the total NADH , $FADH_2$ and ATP yield in the complete aerobic respiration of one molecule of glucose.
12. Define the terms deamination, urea, and the oxidation of fatty acids.
13. In very general terms, explain how fats and proteins could enter into the respiration pathways.
14. Discuss the alternate fates of pyruvate; i.e., fermentation vs. aerobic respiration.
15. Discuss the purpose of fermentation and the overall energy yield of a glycolytic-fermentative system as compared to the ATP yield from aerobic cellular respiration. Use both alcohol (yeast and plants, e.g.) and lactate (some animal tissues and some bacterial cells) fermentations as examples.

LEARNING ASSIGNMENT

You are to perform all of the following to help you attain the LEARNING GOALS:

1. Attend and participate in ALL class meetings.
2. Read pages 137-155 in your textbook.
3. Read the Supplement found at the end of this module.

In order to help you complete the LEARNING ASSIGNMENT above, you may consult with your instructor during his or her office hours and/or consult with a tutor in the Biology Tutoring Center during scheduled hours.

revised March 2005

BIOLOGY 1230 MODULE V HOMEWORK A NAME:_____

1. Review the need for energy in cells.

2. Define:
   a. aerobic respiration

   b. anaerobic respiration

3a. Write the summary reaction/equation for the complete aerobic respiration of glucose. On which side of the equation does the word 'energy' appear?

3b. List the names of the four stages of aerobic cellular respiration.

3c. Define the following terms:
i. decarboxylation reaction.

ii. dehyrogenation reaction

iii. preparatory reaction(s)

4. The following questions refer to glycolysis:
a. In which types of cells does glycolysis occur?

b. Where in the cell does glycolysis occur?

c. What is the gas requirement?

d. Write the summary reaction/equation for glycolysis.

e. Describe the energy investment and energy capture phases of glycolysis.

f. What is the role of NAD^+ in glycolysis?

g. What is the *net* ATP production? (Hint: Consider how many ATPs are used compared to how many are synthesized).

5. Define the term substrate-level phosphorylation.

6a. Under what gaseous conditions is pyruvate converted to acetyl CoA?

b. What is the cellular location of this conversion?

6c. Complete the following equation for the conversion:

2 pyruvate + $2NAD^+$ + 2CoA ------> _____ + _____ + _____

d. Define the term oxidative decarboxylation reaction.

7a. Write the summary reaction/equation for the citric acid cycle.

b. Where in a eukaryotic cell does citric acid cycle occur?

c. List the number of carbon atoms in each of the following citric acid cycle compounds:

1. the acetyl portion of acetyl CoA :_____; 2. oxaloacetate: _____; 3. citrate: _____

7d. Complete the following word equation for the initial step of the citric acid cycle.

acetyl CoA + _____ ----------> citrate + _____

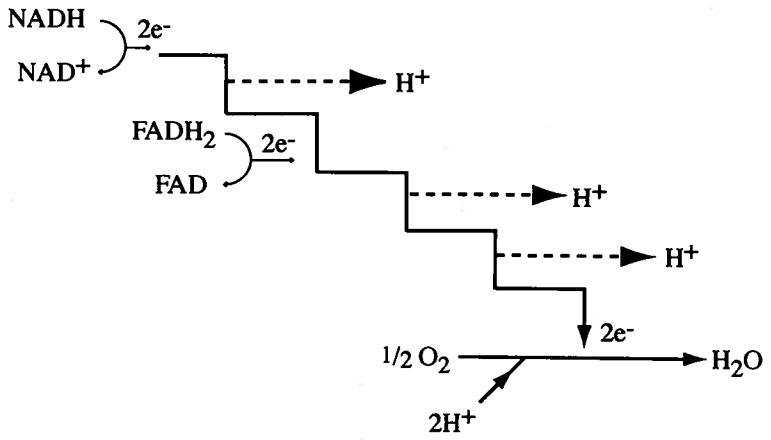
e. When all of the carbon atoms from one molecule of glucose have entered the citric acid cycle, how much of each of the following compounds are produced (in the citric acid cycle alone)?

1. ATP _____ 2. NADH _____ 3. $FADH_2$ _____ 4. CO_2

f. At this point, to what molecule have all the carbons from the original glucose been converted to?

8a. Define the term electron transport system.

8b. Examine the following 'staircase' energy diagram of electron transport and answer the following questions:



i. Is NADH and $FADH_2$ oxidized or reduced via electron transport?

ii. Is O_2 oxidized or reduced via electron transport?

ii. What would happen if O_2 is not present?

iv. Is the electron transport system an overall endergonic of exergonic process?

v. State the location of the components ('stair steps') of the electron transport system in a eukaryotic cell.

vi. What are names of some of the components in the previous question?

vii. Are more hydrogen ions (protons) transported as a result of the participation of one molecule of NADH or $FADH_2$? Justify your answer.

ix. The electron transport system is usually described as a series of redox reactions? Do you agree or disagree with this statement? Justify your answer.

9. Describe mitochondrial chemiosomosis by answering the following:

a. How is a hydrogen ion gradient established in different regions of a mitochondrion?

b. Describe where the energy to establish this hydrogen ion gradient comes from.

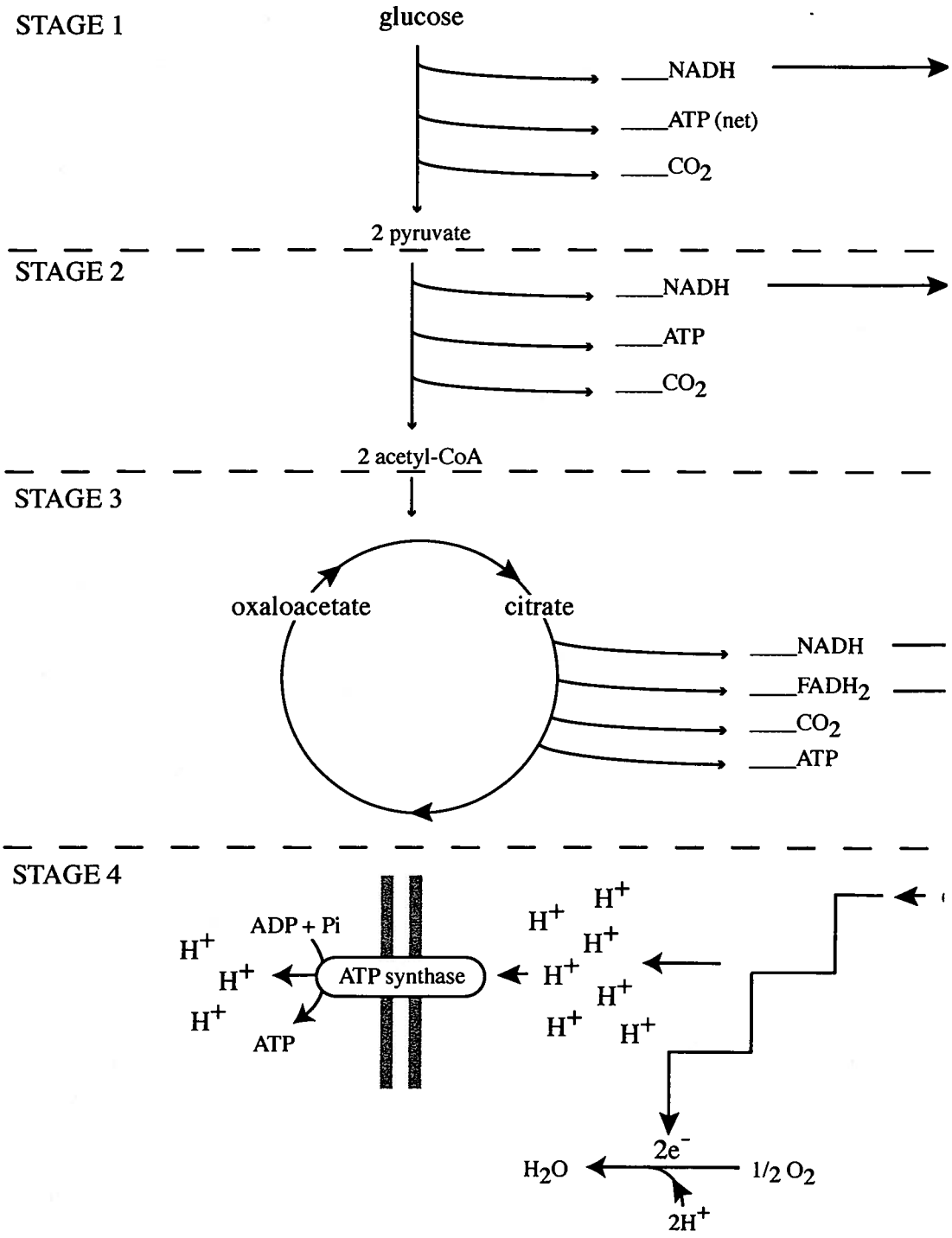
c. Which region of a mitochondrion would be more acidic, the mitochondrial matrix or the intermembrane space? Why?

9d. How is the hydrogen ion gradient 'put to work' to synthesize ATP? In this part of the process, hydrogen ions are being transported from where to where? Is this a result of active pumping or passive movement of hydrogen ions?

e. Where is ATP synthase located in a eukaryotic cell? Be specific!

10. Define the term oxidative phosphorylation.

11. THE BIG PICTURE. Fill in the blanks to the yield questions with the correct numbers.



11a. Refer to the illustration on the previous page and answer the following:

a. Identify (name) the stages:

Stage I _____ Stage II_____

Stage II _____ Stage IV_____ &_____

11b. How many molecules of ATP are produced per molecule of glucose that enters the aerobic cellular respiration pathway? (Assume the process goes to completion): _____

c. What is the ATP yield per molecule of NADH that enters the ETS & participates in chemiosmosis? What is the value for a molecule of $FADH_2$?

12. Define:

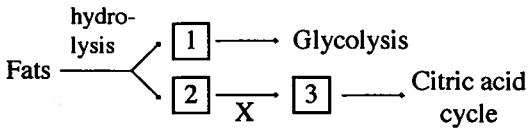
a. deamination

b. urea

c. oxidation of fatty acids (β-oxidation)

13a. In very general terms, *explain* how fats and proteins can enter into aerobic respiration pathways.

13b. Catabolism of neutral fats



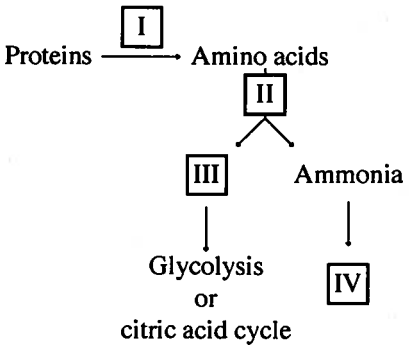
Identify the intermediate compounds 1, 2, and 3 for fats, and name the process labeled X:

1. _____ X. _____

2. _____

3. _____

c. Catabolism of proteins



Identify process I:

Identify process II:

Identify compound III:

Identify compound IV:

14a. List the fate of pyruvate when oxygen is absent.

b. What is the 'purpose' of fermentation?

14c. Complete the following equation for an alcohol fermentation:

pyruvate + NADH ------> _____ + _____ + _____

d. Complete the following equation for lactate fermentation:

pyruvate + NADH -----> _____ + _____

BIOLOGY 1230 MODULE V HOMEWORK A NAME:_____

15a. Where is ATP produced in a glycolytic-fermentative system (lactate and alcoholic)?

b. How much ATP is produced (net) per molecule of glucose in a glycolytic-fermentative system?

c. Which has the greater yield of ATP, a glycolytic-fermentation pathway or aerobic cellular respiration? Include actual numbers of ATP synthesized (net).

Multiple Choice: Choose the best answer

_____ 1. Which of the following will still occur if the cell is deprived of oxygen?
a) electron transport b) citric acid cycle c) glycolysis
d) none of the preceding

_____ 2. Which of the following processes requires a net input of energy?
a) glycolysis b) ATP synthesis c) electron transport
d) all of the preceding e) none of the preceding

_____ 3. Which of the following processes releases energy?
a) glycolysis b) electron transport c) both a & b
d) none of the preceding

_____ 4. In a eukaryotic cell, the citric acid cycle occurs in the:
a) cytoplasm. b) mitochondrion . c) chloroplast. d) nucleus.

_____ 5. Alcohol fermentation occurs in a number of plant cell types and microorganisms. The starting compound is _____, with the release of _____ as a product.
a) pyruvate, CO_2 b) lactate, CO_2 c) pyruvate, O_2 d) alcohol, O_2

_____ 6. ATP is synthesized:
a) in glycolysis b) in the formation of lactate from pyruvate.
c) in the formation of acetyl CoA from pyruvate d) two of the preceding
e) a, b & c

_____ 7. An important function of fermentation is to restore _____ to the cell.
a) FAD^+ b) $FADH_2$ c) NAD^+ d) NADH e) pyruvate

_____ 8. Before entering the citric acid cycle, pyruvate
a) gains a CO_2 molecule and binds to CoA.
b) loses a CO_2 molecule and binds to lactate.
c) gains an O_2 molecule and binds to CoA.
d) loses a CO_2 molecule and binds to CoA.

_____ 9. When cells catabolize glucose aerobically, the end products are:
a) alcohol and CO_2 b) NADH and H_2O.
c) H_2O and CO_2. d) O_2 and lactate.

_____ 10. The primary role of oxygen in aerobic respiration is to:
a) yield energy in the form of ATP as it passes down the electron transport chain.
b) act as an acceptor for electrons and hydrogen, forming water.
c) combine with lactate to form pyruvate.
d) is to be reduced to CO_2.

_____ 11. From which of the following processes is urea derived?
a) oxidation of fatty acids b) fermentation of pyruvate
c) aerobic respiration of glucose d) none of the preceding

_____ 12. Which of the following could occur in a eukaryotic cell lacking mitochondria?
a) citric acid cycle b) fermentation c) electron transport
d) none of the preceding

_____ 13. For the following, name the 'process' and direct ATP yield (net):

a) glucose -------> 2 pyruvate Process:_____

ATP yield:_____

b) 2 acetyl CoA --------> 4 CO_2 Process:_____

ATP yield:_____

c) NADH + O_2 -------> NAD^+ + H_2O Process:_____

ATP yield:_____

d) pyruvate + NADH -------> lactate + NAD^+ Process:_____

ATP yield:_____

_____ 14. Which of the following is a prerequisite step for entry into citric acid cycle?
a) conversion of pyruvate to acetyl CoA
b) production of oxygen gas
c) conversion of acetyl CoA to CO_2
d) oxidation of NADH in the electron transport system
e) none of the preceding

_____ 15. The phosphorylation of ADP:
a) is exergonic. b) occurs only when oxygen is present.
c) is endergonic. d) rarely occurs in biological systems.

_____ 16. In which of the following tissues would you expect to find the greatest number of mitochondria on a per cell basis?

a) skin of a basking lizard
b) flight muscle of a bumblebee
c) a bacterial cell in the large intestine of a mammal
d) leaves of a green plant

_____ 17. In cells capable of aerobic respiration, electron transport is coupled to:

a) fermentation of pyruvate.
b) hydrolysis of ATP.
c) glycolysis.
d) chemiosmotic synthesis of ATP.

For each of the following five processes (18-22), indicate whether the overall process is exergonic, endergonic, or neither:

_____18. electron transport

_____19. protein synthesis

_____20. muscle contraction

_____21. hydrolysis of ATP

_____22. cellular respiration

_____ 23. Which of the following letter choices best represents the products of glycolysis, if a single molecule of glucose begins the process?

a) 2PGAL, 2ATP (net), and $2NAD^+$
b) 2pyruvate, 2ATP (net), and 2NADH
c) 1pyruvate, 4ATP (net), and 4NADH
d) 4pyruvate, 4ATP (net), and 4NADH
e) $6O_2$, $4CO_2$, and 18 ATP (net)

_____ 24. Which of the following represents the location of glycolysis in a eukaryotic cell?

a) the cytoplasm b) the mitochondrial matrix c) the outer mitochondrial membrane
d) the inner mitochondrial matrix

_____ 25. Why is O_2 necessary for the operation of the aerobic electron transport system?

a) The O_2 combines with carbon to make CO_2.
b) To accept electrons from the electron transport system.
c) To provide electrons to catalyze the reaction ADP + Pi --->ATP
d) To reduce $FADH_2$.
e) To reduce NADH.

_____ 26. Which of the following statements concerning chemiosmosis is true?

a) Chemiosmosis is an essential step in fermentation.
b) ATP is synthesized by the use of energy released as hydrogen ions are pumped from a region of low concentration to a region of high concentration.
c) Chemiosmosis occurs when water passes through the plasma membrane.
d) ATP is synthesized by the use of energy released as hydrogen ions diffuse from a region of high concentration to a region of low concentration.
e) ATP is synthesized as a substrate level type of phosphorylation.

_____ 27. The two major catabolic pathways by which cells extract free energy from complex organic compounds are:

a) metabolism and catabolism.
b) anaerobic respiration and aerobic respiration.
c) fermentation and glycolysis
d) endergonic catabolism and exergonic anabolism
e) none of the preceding

28. Indicate in which stage(s) of aerobic cellular respiration (I-IV, see below) the stated process occurs (a-r). Use as many Roman numerals as appropriate.

I. glycolysis
II. conversion of pyruvate to acetyl CoA
III. citric acid cycle
IV. electron transport system and chemiosomsis

_____ a. oxidation of $FADH_2$

_____b. reduction of FAD^+

_____c. oxidative phosphorylation

_____d. substrate-level phosphorylation

_____e. oxidative decarboxylation

_____f. oxidation of glucose

_____g. CoA is a reactant

_____h. pyruvate is a product

_____i. O_2 is reduced

_____j. phosphate groups are removed from ATP molecules

_____k. pyruvate is a reactant

_____l. oxaloacetate is converted into a six-carbon compound

_____m. ATP is a product

_____n. oxidation of NADH

_____o. reduction of NAD^+

_____p. CoA is a product

_____q. CO_2 is a product

_____r. phosphate groups are added to ADP molecules

_____s. decarboxylation

29. For each of the following sets of molecules, circle those with the greater potential energy content.

a. one molecule of glucose : two molecules of pyruvate
b. one molecule of glucose : one molecule of fructose-1,6-bisphosphate
c. one molecule of glucose : six molecules of CO_2 + 6 molecules of H_2O
d. one molecule of glucose : two molecules of glyceraldehyde -3-phosphate

30, A reaction in which a COOH group is removed from a substrate is known as a ___ reaction.

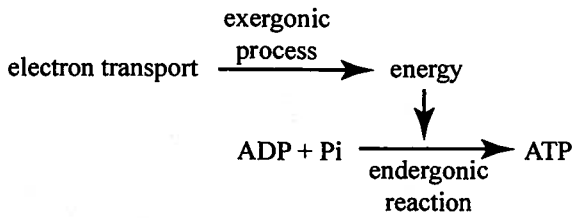
a. dehydrogenation b. hydrogenation c. decarboxylation d. carboxylation
e. redox

BIOLOGY 1230 MODULE V SUPPLEMENT

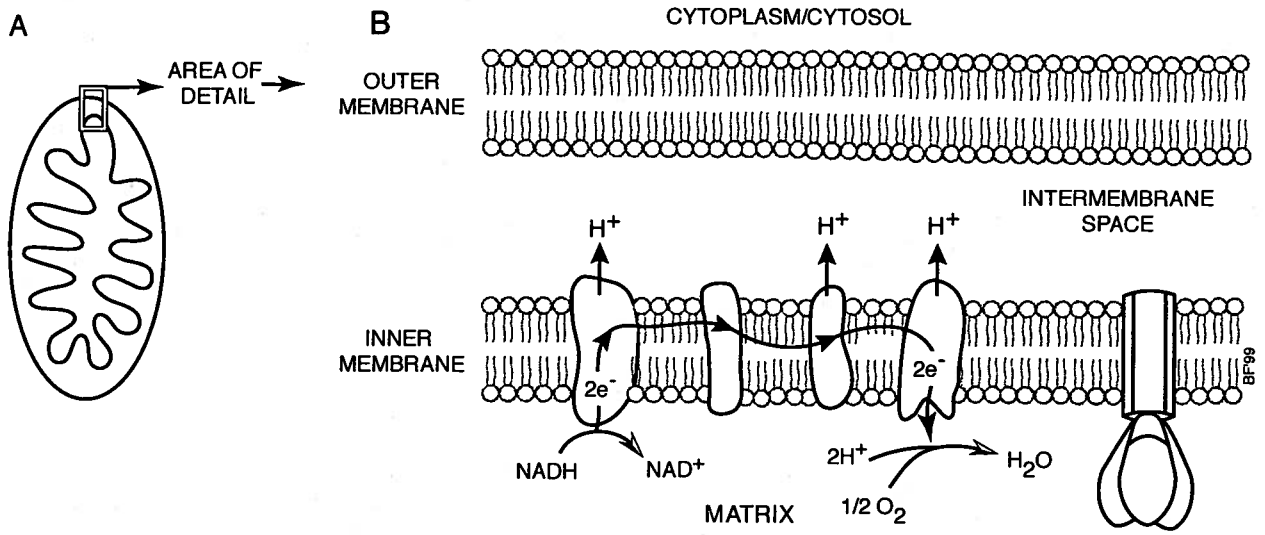
CHEMIOSMOSIS AND BIOCHEMICAL COUPLING

Within the living cell, biochemical pathways are often thermodynamically coupled, i.e., the energy produced in a particular pathway is trapped and used to drive a set of energy requiring (endergonic) reactions. The chemiosmotic production of adenosine triphosphate (ATP) in aerobic cellular respiration is an excellent example of such biochemical coupling..

Let us consider the electron transport chain as an energy releasing (exergonic) process or machine. Electrons move down an energy gradient from NADH and $FADH_2$ to molecular oxygen (O_2), releasing energy as they are passed along. This energy is captured by the cell and is used to provide energy required for the synthesis of ATP.



How is this accomplished? Lets look at the process in more detail and focus on the inner mitochondrial membrane.



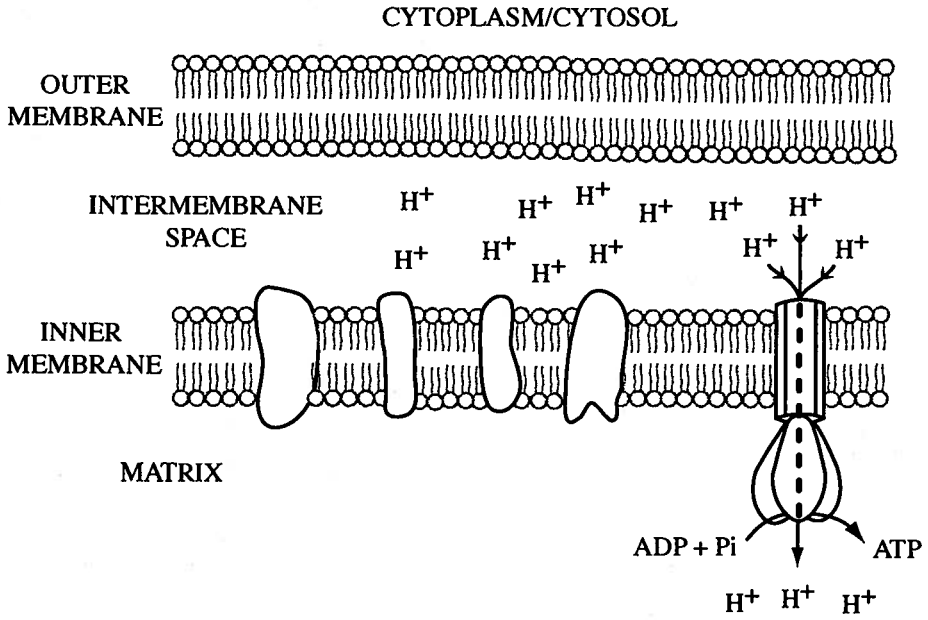
Creation of a Proton Gradient

Figure A is a low magnification drawing of an unlabeled mitochondrian showing the outer and inner mitochondrial membranes, intermembrane space and the mitochondrial matrix.

Figure B shows a close-up of the inner mitochondrial membrane containing the electron transport chain/ system.

As electrons are passed down the chain in a series of oxidation/reduction reactions, they move from high energy compounds to lower energy compounds which yields energy (review the 'energy stair-step' diagram in Homework A). Some of the energy released is actually used to pump hydrogen ions (H^+ or protons) across the inner mitochondrial membrane by means of special protein carrier molecules. This results in the creation of a proton gradient. (A proton gradient is an unequal distribution of protons, in this specific case, across the inner mitochondirial membrane.)

C



Chemiosmosis

Figure C is essentially the same as Figure B, except that our focus is now on the synthesis of ATP.

As electron transport continues, protons rapidly accumulate in the intermembrane space. You might think of it as a dam in a river, with water piling up behind it. This represents a source of potential energy, and indeed, in hydroelectric plants, this energy is tapped by allowing water back down its energy grandient and driving electric turbines. This is analogous to what happens in the inner membrane. The source of energy, based on a hydrogen ion concentration gradient, is commonly referred to as a proton motive force or *pmf*.

A special membrane protein, ATP synthase, forms a channel in the inner membrane, allowing protons to pass from the intermembrane space to the matrix. (recall from Module 3 that the phospholipid bilayer is impermeable to charged particles.). In a extremely complex process, energy given up by the protons as they move down their concentration gradient is used by ATP synthase to catalyze the endergonic phosphorylation of ADP to ATP.

This, in essence, is the process of chemiosmosis. Adenosine triphosphate producted in this manner is formed by a process sometimes called oxidative phosphorylation. This term reflects the dependence on the redox reactions of an electron transport chain and on oxygen for ATP synthesis. Most of the ATP synthesized during aerobic cellular respiration is made in this way. The ATP that is synthesized without an electron transport transport chain, oxygen, or chemiosmosis is formed by the process called substrate-level phosphorylation.

APPENDIX C:

General Biology I
Laboratory Syllabus

Spring/07

SYLLABUS

BIOL 1230

General BIOLOGY LABORATORY

Xavier University of Louisiana

Section	Day	Time	Room	Instructor
1.	Monday	10:00 - 11:50	NCF416	Dr. Bandaranayake
2.	Monday	3:00 - 4:50	NCF416	Dr. Bandaranayake
6.	Tuesday	9:25 - 11:15	NCF416	Dr. Bandaranayake
4.	Tuesday	1:15 - 3:05	NCF416	Dr. Bandaranayake
5.	Wednesday	3:00 - 4:50	NCF416	Dr. Bandaranayake
3.	Thursday	3:15 - 5:05	NCF416	Dr. Bandaranayake

My Instructor: _____ Office : _____ Office Hrs : _____

_____

_____

Course Description

An introduction to basic elements of biological science and concepts that relate to biological science

Required Texts and Internet address

1. Vocabulary for the College Bound Student (4th Edition). Levine, H., Levine N. and Levine R.T. (2003). AMSCO School Publications, Inc.. N. Y., New York
2. A Student Handbook for Writing in Biology. Karin Knisely (2002). Sinauer Associates, Inc.
3. Blackboard of Xavier University
   http://blackboard.xula.edu/

Course Objectives

1. An introduction to the principles of the Scientific Method
2. An introduction to data collecting, analysis and presentation
3. An introduction to the use of the Microscope and develop observational skills as it applies to simple biological systems
4. An experimental approach to selected biological concepts previously presented in lecture
5. Improve the general vocabulary.

Course Policies

Attendance and punctuality are required. Every lab will begin and end at the times designated for that section. In the event of an absence, no matter what the reason, the student will be responsible for all the material covered during the period missed. **Each absence will result in the loss of all the attendance and performance points for that period.** In addition, points may be

lost as well if home work was due and if vocabulary and regular quizzes were given during that period.

Xavier's policy with regard to 1000 level courses states that a student , who misses more than two lab classes for any reason, will earn an automatic FE for the course (failure due to excessive absences).

You are thus provided with two absences to deal with serious circumstances such as serious illness, death in the family. Only under such serious circumstances will you be able to make up a lab in another session provided that

- you provide the instructor with legitimate documentation
- you are able to make up the lab in the same week as the one you missed
- you obtain permission from the instructor who teaches the lab that you will want to sit in

Any other excuse will not be accepted (such as traffic was backed up, oversleeping, had to study for another exam, left town early for vacation...) !! **You are ultimately responsible for your actions.**

Use of Blackboard in the event of University closure:
In the event the University closes due to hurricane or other reason, this course will continue through Blackboard. It is the responsibility of each student to access Blackboard frequently and to follow any instructions given there during any University temporary closure. If you are required to leave your residence, be sure to take your texts and other course materials with you. It is the expectation of the University that academic functions will continue to the fullest possible extent during any closure .

Finally, keep in mind that if you miss a lab on the last day of a weekly session, there will be no way to make it up. **The same holds true for missing an exam.**

Course Evaluation

	Points	% of Grade
Performance points (9 labs @ 10 pts.)	90	22.5
Assignments/ Lab Quizzes	90	22.5
Vocab quizzes	20	5
Mid Term Exam	100	25
Final Exam	100	25
Total points :	**400**	**100%**

Grade Distribution	
90 % or higher	**= A**
80% - 89 %	**= B**
70 – 79 %	**= C**
60 – 69 %	**= D**
Less than 60 %	**= F**

Explanations on Point system

1. *Attendance and Performance*

A student will forfeit all points when absent. Upon discretion of the instructor, points may be deducted for

- Being tardy

- Not performing and/or participating (sleeping, not doing the required work, reading material not related to the course)
- Any interference with the instructors' lecture or with the ability of another student to pay attention (such as talking while the instructor is teaching, being judgmental or negative to others)
- Disregard of lab safety and lab equipment.
- In general, any behavior which the instructor believes might impinge on the rights and abilities of students to feel comfortable and learn, may result in the violating student(s) being dropped from the class.

In addition, you may be required take a quiz on Blackboard to earn the performance points. Time for these quizzes will be announced and you will be given a 24 hour window to take it. Please check announcements on Blackboard and your xula.edu email on a regular basis for useful information about class.

There is no hardcopy of a lab-manual to buy. In order to save you money, we created our own lab manual for this course. You will be responsible to download the required lab exercise from BlackBoard. Do this at least one day before your scheduled class period. Failure to bring the lab exercise to class will result in loss of performance points.

2. ***Lab quizzes and vocabulary quizzes***

All quizzes will be taken in the lab.
There will be eight (8) multiple choice vocabulary quizzes. Each quiz is worth 2.5 points
Format and the date of the other quizzes will be provided by your instructor.

3. ***Homework Assignments***

Homework will be assigned at regular intervals. Details will be given during the lab sessions. Points will be lost for sloppy work, tardiness, failure to comply to guidelines, etc. No excuses will be accepted for missing an assignment. The purpose of the homework is for your educational benefit. It is an individual effort to enhance your thinking, observation and analysis. The homework is always <u>due one week</u> after it is assigned AND IS TO BE TURNED IN DURING THE LAB. Late homework will not be accepted and graded with a "0".

The details and format with respect to the homework will be discussed during the semester. Late work will not be accepted. You have plenty of time to prepare the required work. Laziness or bad planning on your part creates problems not only for yourself, but also for your instructor. Manage your time and work properly. Points earned are directly proportional to effort invested.

Each report will be an individual effort. No copied work in any form will be tolerated. It has to represent your own effort. Presenting work which is not yours (copying someone's else's report, re-writing paragraphs and sentences straight from a book or from an internet source, ...) and expecting points for work that you did not do yourself is considered a form of cheating and will be handled as such.

4. ***Examinations***

Two exams will be given during the semester: a midterm exam and a final exam. The dates are indicated on the calendar and are given during the normal lab hours. The midterm exam will have a written and practical component to test your knowledge. The final exam is only a written exam but will be comprehensive. YOU CANNOT TAKE A SCHEDULED EXAM WITH ANOTHER INSTRUCTOR!

5. *Cheating*

Cheating, or letting another student copy your work, will not be tolerated. As a Xavier student, you not only have your reputation and integrity to think about, but that of the University as well. The first incident of cheating will result in a zero on the particular assignment, quiz or test. Any serious offense or a second minor offense will result in an "F" for the course. All incidents of cheating will be reported to the departmental chairperson and to the college dean.

6. Disputes about homework points or exams scores will only be entertained for one week after the work/exam was handed out. There will be no discussion what so ever after one week.

Do not ask for extra credit. There is none !!!!

7. *Cell phones*

Cell phones have no educational value in class and are a distraction to students and instructors. You will turn off your cell phone and it put it away. If you decide that you can't live without the use of your cell phone, you will be asked to leave class and forfeit your performance points.

Tentative Lab Calendar Spring 2007

Lab Number	Dates	Topic	Vocab pp.
Lab 1	January 16 (T) - 22 (M)	Intro to Scientific method	
Lab 2	January 23 (T) - 29 (M)	Measurements/Metric System	pp. 1 - 23
Lab 3	January 30(T) - February 5 (M)	Microscope	pp. 24 - 45
Lab 4	February 6(T) - 12 (M)	Living Cells	pp. 46 - 57
Lab 5	February 13 (T)– 26 (M)	Diffusion/Osmosis	
	February 19 (M) – 23 (F)	**Mardi Gras Break !**	
Lab 6	February 27 (T)– March 5 (M)	Osmosis and Graphing	pp. 58 - 69
	March 6 (T) – 12 (M)	**MIDTERM EXAM**	
Lab 7	March 13 (T) – 19 (M)	Spectroscopy	pp. 80 - 91
Lab 8	March 20 (T) - 26(M)	Aspects of enzymes	pp. 92 - 106
Lab 9	March 27 (T) - April 2 (M)	Respiration	pp. 107 - 122
	April 3 (T)- 6 (F)	**Easter!**	
Lab 10	April 9 (M) - 13 (F)	Photosynthesis	pp. 122 - 145
	April 16 (M) - 23 (F)	**TBA**	
	April 23 (M) - 27 (F)	**FINAL LAB EXAM**	

Rules and Expectations

1. You are now at a University. High school is over. Act accordingly
2. Being at Xavier University of Louisiana is a privilege, not a right or a given. To be here does not mean you will be given a golden pass to medical school or any other graduate school. You will have to earn your grades. They will never be given.
3. To earn your grade you will have to study, and study hard. The two extreme profiles of a student are given below
   - An A student always studies in advance, reads the sections in the textbook, pays attention and takes good notes, finds answers to questions and is prepared because he/she studies every day, and is not afraid to ask for help or work with others.
   - A D student shows little interest, hates to read, takes bad notes and never checks with the textbook if his/her notes are correct, misses classes, is unorganized, doesn't feel the need to study regularly.

4. Xavier has a good reputation because we guide hard working students to exploit their potential. Listen to good advice !
5. Faculty have heard all possible excuses for being late, being absent, failure to do reports, bad grades. Excuses are signs that a student is not ready for the demands of a University. Mature students take responsibility and don't waste their time (or the professors' time) with excuses. A good student overcomes adversity and puts in the extra effort to succeed. You are responsible for your own actions. SHOW US WHAT YOU CAN DO .... DON'T SHOW US WHAT YOU CAN NOT DO.
6. You are in the BIOLOGY department. Therefore we EXPECT you to have a genuine interest in all aspects of BIOLOGY and SCIENCE in general. If you have no such interest, you may want to change your major. Chances of success will diminish drastically if interest and curiosity are lacking. Chinese fortune cookie says " The beginning of wisdom is to desire it ".
7. If you fail the same biology class twice (earn a D or lower), you will be asked to transfer out of the biology department !
8. All your grades count towards your future. Your attitude counts as well. Down the line, you will need letters of recommendations from professors. Poor performance, lack of interest and bad attitude leaves not much room for a professor to speak highly of you in his/her letters. We are honest in our letters. Don't expect us to lie for you.
9. At a University, studying is your JOB. If your work interferes with studying then you need to talk with your advisor, parents, employer.
10. **Turn cell phones off. There will be no calls made or answered in the class room. It is disruptive and rude. The same is expected when visiting your professor in her or his office. There will be no use of iPOD's or any other ear listening devices in class either. Unless you were born with an audio device implanted in your ear, they are to be removed when coming to class !**

APPENDIX D:

Microbiology Lab Exercises

A Description of Modifications to Microbiology Existing Microbiology Lab Exercises and Possible New Exercises.

1. Growth curve employing *Beneckea natriegens:* The chief advantage of this organism over more traditional microbiology laboratory species is its extremely fast growth rate: in excess of five doublings per hour are possible. This is ideal for a setting with relatively limited laboratory time. The organism is also easily and inexpensively grown and completely harmless. Students can follow growth using simple spectrophotometric equipment and/or the serial dilution technique that they will have already learned in the fungal spore enumeration exercise. Use of turbidimetric monitoring has the advantage of providing instantaneous data.

2. Minimal inhibitory concentration (MIC) determination, by serial doubling dilution, using *Escherichia coli* (or any other bacterial species commonly employed in microbiology laboratory courses) and several common antimicrobial agents, including at least one sulfonamide, a cephalosporin, another beta-lactam drug, and a macrolide. After preparing the dilution series, students can then very easily mix the tubes with an equal volume of double strength nutrient broth, inoculate with a standard volume of organism, and incubate overnight. MIC can be determined as the mean of the highest non-inhibitory and lowest inhibitory concentrations.
This approach is preferable to the Kirby Bauer technique, which produces data that is more nebulous and intrinsically far more difficult for students to appreciate—plus it is somewhat antiquated as most often these days antibiotic sensitivity testing is handled via an automated system.

MIC can also be determined in a relatively simple, agar-plate based one-step process employing commercially available strips saturated with a concentration gradient of the drug of choice ("*E-strips*"). These strips are printed with a scale that reflects the approximate concentrations along the gradient. This option has the advantage of relative simplicity. However, the strips are not inexpensive and the methodology lacks the opportunity to reinforce certain key lab skills—accurate pipetting technique etc. Numerous variations on the doubling dilution technique above can also be performed, *e.g.* with heavy metals (*e.g.* Cu[II], Cd[II], Pb [II]), with sugars or other solutes to assess the effect of water availability, with NaCl to assess salt toleration etc.

3. Thermal death in vegetative *Bacillus* versus endospores: Actively growing *Bacillus* cells can be aliquoted into tubes, in parallel with a similar series of *Bacillus* spores, and placed in a water bath at 80C. Tubes can be removed at various time intervals and plated out as above in number 1 to determine numbers of viable cells per ml by serial dilution and subsequent plating.

4. Virtual Microscope website (as assignment)

5. Viable Counting: Include more quantitative questions. Modify the exercise by having four groups in the lab. Give two groups, (1 and 3) the exact same starting concentration of spore suspension, give the other two groups completely different concentration. Then

after the entire experiment is over students will have 20 minutes of 'in class' dry exercise of collecting data from each group, compare the different dilutions and analyze the results. Compare results of groups 1 and 3, typically they are not identical. Students can then come up with hypothesis as to why these results are not the same etc. Problems will include mathematical calculations of how the results would vary based on the different dilution factors as well as the inoculum size that is plated.

APPENDIX E:

Center for the Advancement of Teaching (CAT) Course Portfolio Project, List of Assessment Tools

Tools of Assessment

1. **Case study**: Hypothetical or real case assignments invite students to demonstrate how well they have mastered course content in practical, real-world applications. [Details & Summaries]

2. **Discussion**: When structured and guided properly, classroom discussions can be used to assess student learning. [Details & Summaries]

3. **Essay**: The essay is one of the best means for assessing higher-level critical thinking, across the disciplines. [Details & Summaries]

4. **Exam**: Examinations are perhaps the most traditional method for assessing student learning. In-class exams, take-home exams, oral exams...the aim of all these instruments is to gauge knowledge and skills as objectively as possible. A test can only test what it asks about; the thoughtful design of an exam as a whole and of individual questions is, therefore, of paramount importance. Particular attention needs to be paid to the types of knowledge and skills called for. Some questions test merely rote memory; others test higher-order critical thinking skills. [Details & Summaries]

5. **Exam analysis**: Exam analysis provides a way to use a test not only for its primary purpose of measuring a student's individual learning but for the more general purpose of discovering how a class as a whole is performing in certain skill and knowledge areas. One can designate all or just certain exam questions according to types of skill or knowledge. Then, student performance can be mapped and, if later tests are analyzed in this same way, changes over time can be observed. [Details & Summaries]

6. **Faculty evaluation form**: The faculty evaluation form that students typically complete at the end of a semester can be used to gauge student perceptions about a class and their learning in it. [Details & Summaries]

7. **Field work**: Observation of students applying knowledge outside the classroom walls is a good way to measure how well they can practically apply theory. [Details & Summaries]

8. **Group project**: Projects completed by groups can reveal the extent to which students have grasped knowledge and applied skills—both cognitive and interpersonal. [Details & Summaries]

9. **Homework analysis**: The performance of students on homework assignments can be analyzed to learn the extent to which concepts are being grasped and/or skills are being mastered. [Details & Summaries]

10. **Informal writing**: Free-writing with an emphasis strictly on ideas, not correctness of spelling, punctuation or grammar; provides a means to gauge higher-level critical

thinking skills: going beyond the obvious, recognizing multiple perspectives, constructing weighted value judgements, noticing assumptions, and so forth. [Details & Summaries]

11. **Interactive computer-assisted instruction**: Computer-assisted instruction allows students to learn at their own pace. If designed properly, such programs make learning stimulating and fun. [Details & Summaries]

12. **Interview**: Interviews can be conducted by the teacher to gauge what a student knows and can do with that knowledge; i.e., an oral examination; or by a third party, usually a fellow teacher, can interview students to provide attitudinal data that can be valuable to answering questions about teaching or learning in specific contexts. [Details & Summaries]

13. **Online writing (discussion boards, emails, blogs)**: Sharing writing electronically via computer is a powerful tool for collaboration, problem-solving, analysis, and discovery. The resulting discussions and dialogues can be studied to measure various types of learning. As with exams, it is important to set up and moderate the online writing experience in a way that direct students to apply the kinds of knolwedge and skills one wants to assess. [Details & Summaries]

14. **Oral presentation**: Observing and evaluating student presentations, especially with a well-designed rubric, is a time-tested method for assessing learning, both theoretical and practical. [Details & Summaries]

15. **Peer observation**: Inviting an outside observer into one's classroom or lab is a good way to perceive classroom interactions and behaviors that either add to or hinder learning--interactions and behaviors that the instructor would otherwise miss from his or her vantage point. This method is best used if the observer is given specific instructions of what to look for or to tally: behaviors that impact the learning studied. A rubric or checklist is helpful here. [Details & Summaries]

16. **Peer review**: Inviting a colleague to review student work with particular assessment goals in mind is a good way to move beyond the teacher's perspective. This is especially effective when the peer reviewer has a clear understanding of what the teacher is trying to do and of the types of student outcomes he or she is trying to gauge. [Details & Summaries]

17. **Questionnaire**: This method allows one to measure subjective changes in perception or attitude that impact learning. [Details & Summaries]

18. **Quiz**: Shorter and with less points at stake than in an examination, quizzes provide useful snapshots into what students have and have not learned. [Details & Summaries]

19. **Quiz: cumulative learning**: A quiz (or a section of a quiz) devoted to concepts covered in earlier weeks is a way to measure how well and how deeply concepts

"stick" over time. [Details & Summaries]

20. **Reflective writing: journals/special assignments**: Reflective writing provides a means by which students (and teachers) can organize their learning experiences in narrative form, recording insights to benefit their own understanding and to facilitate its assessment. [Details & Summaries]

21. **Sampling of student work**: Providing representative samples of student work on a particular test or task is a good way to get a handle on an array of questions. Where do most students fall in a grid of "high," "middle," and "low" on the particular skill or knowledge? Is it a bell curve or a quite different shape that might be rife with significance? [Details & Summaries]

22. **Special assignment: extra-credit writing**: Short writing assignments can be designed to gauge certain aspects of student learning, the "carrot" being a chance to earn extra points. [Details & Summaries]

23. **Special assignment: other than writing**: A special assignment, given to students outside of the normal workload of a course, provides a way to derive strategic feedback on what they know and what they can do. [Details & Summaries]

24. **Videotape**: Recording classroom interactions or student performance on video provides a wealth of information that can be analyzed by the instructor alone, by the student, by an outside consultant, or by any combination of the above. [Details & Summaries]

APPENDIX F:

Letter of Support for Biosciences Internship Program

greater new orleans inc.
The Regional Economic Alliance

365 Canal Street • Suite 2300 • New Orleans, LA 70130
tel: [504] 527-6900 • fax: [504] 527-6970 • web: www.gnoinc.org

Dr. Gene D'Amour
Sr. Vice President for Resource Development
Xavier University

March 15, 2007

GNO, Inc., the 10 parish economic development organization in the New Orleans region, is happy to work with and support the Biosciences Internship described in the Xavier University Biothrust 21 proposal. We believe that the proposal is important to expanding career opportunities for young citizens in our community. The program as outlined will foster early exposure and entry of students into bioscience career paths, while also building the necessary workforce to grow the local biosciences sector.

Moreover, Xavier has a good track record in working with GNO, Inc. over the past few years, as an active partner in our Life Sciences Cluster. We look forward to furthering this relationship as we collaborate in the proposed grant activities and overall bio sector developments.

Sincerely,

Dino Paternostro
Sr. Vice President of Public Policy
Greater New Orleans, Inc.

APPENDIX G:

Description of a Sample Dissemination Conference Sponsored by Xavier

Dissemination Plans Overall

Xavier is one of only six unique institutions across the nation to have been awarded funding from the National Science Foundation as a Model Institution for Excellence. This program, originally funded in 1995, is in its third and final phase. Part of our efforts in this phase are focused on disseminating components of the Xavier model that have proven to be key to getting students entering into and matriculating through graduate and professional schools in the STEM areas. Our overall goal in this effort is to provide a select group of HBCUs with the tools and resources necessary for implementation of selected components of the Xavier's model at their home institution. A second goal is to provide a national audience interested in transforming STEM climates to be inclusive to minority students. Model components on which we have focused our efforts are 1) curriculum reform/development, 2) faculty development, and 3) undergraduate research. Several approaches are being used to disseminate information concerning the model. These include the participation in national and local dissemination conferences. National conferences were hosted by NSF and other MIE institutions. Two local conferences with national participants will be hosted by XU. Dissemination will also be accomplished via publications in journals and faculty presentations at national conferences such as AAHE, AAAS, AACU, CUE-ASM. Lastly, program literature will also be distributed in the form of brochures and CD-ROMs

Dissemination currently

Since 2004, Xavier has been participating in various dissemination conferences hosted by NSF or other MIE institutions. The latest, a national conference hosted by Bowie State, occurred in October of 2006. Xavier held it first MIE Dissemination workshop in January 2007. The purpose of the workshop was to (1) to distribute Xavier's best practices in the areas of faculty development, curriculum reform/development, and undergraduate research and (2) to establish working relationships with a select pool of HBCUs. Four institutions, Norfolk State University, Paine College, Savannah State University, and Stillman College sent 3 member groups consisting of a faculty member, a department al chair, and a Dean or program director.

Prior to attending, each institution was asked (1) to select curriculum reform, faculty development, or undergraduate research as their area of focus, (2) to determine what they hope to accomplish within the upcoming year and (3)to assess their institution's strengths, weaknesses, opportunities, and threats (obstacles) as they pertain to achieving their desired outcome. All except one submitted specific topics of interest for each focus area. The workshop consisted of approximately six general sessions and three planning sessions. The general sessions on day one provided an overview and history of MIE at Xavier and a personal account of the keys to establishing an extramurally funded research program while being an exemplary educator and service oriented faculty member. On day two, participants attended general sessions on curriculum reform, faculty development, establishing a center for undergraduate research, successful proposal writing, and the Virtual Diversity Center, a web-based comprehensive STEM educational and funding resource tool.

Facilitators sought to relate and integrate topics of interest in each area such that an overall and narrowly focused goal could be determined and plans for implementation developed. The workshop concluded on day three with each team presenting their objectives and plans for the upcoming year

Plans developed for implementation by school:
Norfolk State University plans to adopt XU model for pre-college summer programs utilizing high school teachers as instructors. Unlike Xavier, their program will focus solely on mathematical skills.
Stillman College developed the framework for development of a Center for Academic Excellence. Their plan combines aspects of XU Center for Undergraduate Research and Center for Advancement of Teaching. They will use components of the XU model for faculty development and undergraduate research.
Paine College is seeking to implement XU model in area of curriculum development/revision. They were most interested in the coordinated curriculum of the freshman level STEM courses and the revision of laboratories courses to include more writing and relevant research techniques.

Working Rating
Workshop participants were asked to complete an evaluation form at the conclusion of the dissemination workshop in order to assist Xavier's planning process and to gage workshop success. Most conference attendees were well satisfied with the workshop, rating it an average of 4 out of 5 overall, with 92% rating the overall experience as either Excellent (5) or Very Good (4). Ninety-two percent of participants also indicated that the conference met their expectations and was a valuable learning experience.

Participants also commented at length on the workshop in a free-form evaluation, suggesting future workshop topics as well as providing discussion of the workshop in general. Several respondents noted that they were helped by the format of the workshop, which allowed them to speak to facilitators and planners regarding their individual plans and to narrow their focus. One respondent noted, "I liked the individual planning sessions as I feel that they were able to be tailored to the needs of the individual institutions", while another commented that what they liked most about the workshop was "The individual attention to the concerns and challenges at each institution. Final feedback and commentary by Dr. McKinney and others was very productive." Lastly, Ms Jenna Culhane, the Institute for Higher Education Policy representative, stated "that of the six conferences she had attended, Xavier's was the best, most organized, and perhaps most informative."

APPENDIX H:

Biosketches of Key Personnel

BIOGRAPHICAL SKETCH			
Provide the following information for the key personnel and consultants and collaborators. Begin with the principal investigator/program director. Photocopy this page for each person.			
Name Gene D'Amour		Position Title Sr. Vice President for Resource Development	
EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training.			
INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
St. Mary's College, Winona Minn.	BA	1965	Mathematics & Philosophy
University of Minnesota	Ph.D.	1971	Philosophy of Science & Mathematical Logic

RESEARCH AND PROFESSIONAL EXPERIENCE: Starting with present position, list, in reverse chronological order, previous relevant employment, experience, and honors. Key personnel includes the principal investigator and any other individuals who participate in the development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in reverse chronological order, the titles, all authors, and complete references to pertinent publications during the past five years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

Dr. Gene D'Amour is currently Senior Vice President for Resource Development at Xavier University. His responsibilities include Research Administration, Government Affairs, External Affairs/Board Relations and Institutional Advancement. Dr. D'Amour received his Ph.D. from the University of Minnesota in Philosophy of Science and Mathematical Logic in 1971. He then received a faculty appointment at West Virginia University where he was a Professor of Philosophy for nine years. While at West Virginia University, Dr. D'Amour was instrumental in refining, extending and disseminating a new approach to teaching problem solving, one of four in which the Exxon Education Foundation invested $7 million to encourage widespread dissemination. In 1978, Dr. D'Amour was invited by the National Science Foundation to serve for two years as a "rotator" program manager responsible for the development of national models of science education to serve students in schools, universities and industry.

Dr. D'Amour joined the administration of Tulane University in August, 1980, where over a 22 year period he held the positions of Associate Dean of the Graduate School, Associate Provost, Vice President for Research and Project Administration and then Vice President for Institutional Program Development and Government/Agency Affairs. From 1980 through 1995, Dr. D'Amour developed and played a principal leadership role in implementing Tulane's Strategic Plan to increase research funding. During this period, Tulane increased its Federal R&D expenditures more than seven fold, increased its total R & D expenditure ranking by twenty-three places, and its federal R & D ranking by fifteen. It was one of only three universities in the nation to attain such an increase.

In 1985, Dr. D'Amour became Chair of the Louisiana Stimulus for Excellence in Research Committee (LaSER). As Chair, he led the Strategic Planning process for the newly created $250 million Board of Regents Support Fund. He also was instrumental in organizing and chaired the Coalition of EPSCoR States, a Washington-based association established to enhance the competitiveness of scientists and engineers in states receiving low levels of federal R&D funding. The coalition has initiated legislation that has extended the NSF-EPSCoR program from one to eight Federal agencies and increased appropriations from $10 million to $350 million per year. Louisiana's EPSCoR program has itself received more than $100 million in Federal grants from six different agencies to enhance the science/engineering infrastructure of the state's institutions of higher education. As a result, Louisiana's per-scientist Federal funding average went from 38% to 90% of the U.S. average, a higher increase than any other EPSCoR state.

D'Amour has published one book, "The Nature of Evidence," and numerous articles spanning the Humanities, Social Sciences and Sciences. He has been a consultant in instructional development and faculty development in instruction to more than thirty universities, foundations and government agencies.

BIOGRAPHICAL SKETCH	
Provide the following information for the key personnel and consultants and collaborators. Begin with the principal investigator/program director. Photocopy this page for each person.	
Name Shubha Kale Ireland	Position Title Professor and Chair

EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training.

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
University of Bombay, India	B.Sc.	1981	Microbiology (major) Biochemistry (minor)
University of Bombay, India	M.Sc.	1983	Biophysics
Tulane University, New Orleans	Ph.D.	1991	Biology
LSU Medical Center, New Orleans	Post-doc	1991-1994	Biochemistry and Molecular Biology

RESEARCH AND PROFESSIONAL EXPERIENCE: Starting with present position, list, in reverse chronological order, previous relevant employment, experience, and honors. Key personnel includes the principal investigator and any other individuals who participate in the development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in reverse chronological order, the titles, all authors, and complete references to pertinent publications during the past five years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

Xavier University, New Orleans, Louisiana (Fall 1994-Present)
Chair, Department of Biology (since Fall 2006)

Post-Katrina (October-December 2006) and summer research activities (past 10 years):

Post-Katrina October –December 2006 (Visiting Scientist, ORNL, Oak Ridge National Labs, Oak Ridge TN). Research on ethanol production from *Clostridium thermocellum* and aflatoxin regulation.
Summer 2005: Research at Xavier (DOD-funded Prostate Cancer Project and NIH/ MBRS-funded Aflatoxin Project)
Summer 2004: Research at Xavier (ONR-funded L1 Retrotransposition as a Biomarker project and NIH/ MBRS-funded Aflatoxin Project)
Summer 2003: Research at Xavier (ONR-funded L1 Retrotransposition as a Biomarker project and NIH/ MBRS-funded Aflatoxin Project)
Summer 2002: Research at Xavier (NIEHS-funded L1 Retrotransposition project and NIH, MBRS-funded Aflatoxin Project)
Summer 2001: Research at Xavier (NIEHS-funded L1 Retrotransposition project and NIH, MBRS-funded Aflatoxin Project)
Summer 2000: Research at Xavier (DOD-funded. Optimizing L1 Retrotransposition Assay)
Summer 1999: Research at Xavier (DOD-funded. Cell proliferation Assays using 3T3 cells)
Summer 1998: Visiting Scientist (Howard-Hughes Fellow) at Brown University, RI (Aging)
Summer 1997: Visiting Scientist (DOE-funded) at IGT, Des Plaines, IL (PCB biodegradation)
Summer 1996: Research at U.S.D.A., New Orleans (Aflatoxin work with Dr. D. Bhatnagar)

Honors and Awards

1) Endowed Professorship in Arts and Sciences
Louisiana Board of Regents Eminent Alumni Scholars Program (2003-present)
2) Biology Teacher of the Year 2005
College of Arts and Sciences, Xavier University of Louisiana (April 19, 2005)

3) Certificate for Mentoring Xavier University students (Research)
Center for Undergraduate Research, Xavier University of Louisiana (April 19, 2005)
4) University Award for Securing External Funding (Research)
Xavier University of Louisiana (March 9, 2004)
5) University Award for Eight Years of Mentoring Students (Research and Advising)
NSF-MIE (NSF-funded Model Institutions for Excellence) Program
Xavier University of Louisiana (March 9, 2004)
6) University Award for Excellence in Mentoring Students (Research Award)
Xavier University of Louisiana (February 17, 2004)

Publications and Book Chapters

1) **Kale, S. P.**, Milde, L., Keller, N. P. & Bok, J. W (submitted to Microbiol)). Conservation of the Aflatoxin Regulatory Protein LaeA in *Aspergillus flavus* (journal acknowledgment mic/2006/003582)

2) J. W. Bennett, **S. P. Kale** and J. Yu (in press). "Aflatoxins: Background, Toxicology and Molecular Biology". In Foodborne Diseases" Shabbir Simjee (Ed)., Humana Press, NJ.

3) **Kale S. P.**, M. C. Carmichael, K. Harris and A. M. Engel (2006). *"The L1 Retrotranspositional Stimulation by Particulate and Soluble Cadmium Exposure is Independent of the Generation of DNA Breaks"*. Int. J. Env. Res. Public Health. **3 (2): 121.**

4) El-Sawy M., **Kale S.P.**, Dugan C., Nguyen T.Q., Belancio V., Bruch H., Roy-Engel A.M., and P. L. Deininger (2005). *"Nickel stimulates L1 Retrotransposition by a Post-transcriptional Mechanism"*. J. Mol. Biol. **354 (2): 246.**

5) **Kale S. P.**, L. Moore, P. Deininger and A. M. Roy-Engel (2005). *"Heavy Metals Stimulate Human LINE-1 Retrotransposition"*. Int. J. Env. Res. Public Health. **2 (1): 14.**

6) **Kale S. P.** and D. Bhatnagar (2003). *"Protoplast isolation, Regeneration and Fusion in filamentous fungi"*. In Handbook of Fungal Biotechnology, second edition, Arora (Ed)., Marcel Dekker Inc., New York, NY, **pages 9-24.**

7) **Kale, S. P.**, J. W. Cary, C. Baker, D. Walker, D. Bhatnagar, and J. W. Bennett (2003). *"Genetic Analysis of Morphological variants of Aspergillus parasiticus Deficient in Secondary Metabolite Production."* Mycol. Res. **107 (7): 831.**

8) **Kale, S. P.**, D. Bhatnagar, J. Cary and J. W. Bennett (1996). *"Characterization of Experimentally Induced Nonaflatoxigenic Variant Strains of Aspergillus parasiticus"*. Appl. Env. Microbiol., **62:3398.**

9) **Kale, S. P.** and S. M. Jazwinski (1996). *"Differential Response to U.V. Stress and DNA Damage during the Yeast Replicative Life Span"*. Dev. Genetics. **18:154.**

10) **Kale, S. P.**, D. Bhatnagar and J. W. Bennett (1994), *"Isolation and Characterization of Morphological Variants of Aspergillus parasiticus Deficient in Secondary Metabolite Production"*. **Mycol. Res. 98:645.**

11) Sun J., **S. P. Kale**, A. M. Childress, C. Pinswasdi and S. M. Jazwinski (1994). *"Divergent Roles of RAS1 and RAS2 in Yeast Aging"*. J. Biol. Chem. **269:18638.**

→ OVER

CURRENT AND PENDING SUPPORT

(From ALL sources, including Board of Regents Support Fund)

The following information MUST be provided for each investigator and other key personnel. Use additional sheets as necessary.

NAME OF INVESTIGATOR: Ireland [Shubha K. Ireland] 3/12/07

Status of Support: _X__Current ___Pending ___Submission Planned in Near Future

Contract Number/Proposal Title: Regulation of Aflatoxin Production in *Aspergillus parasiticus.*

Source of Support: NIH/MBRS-Score program. Contract number: 5SO6GM008008-35

Award Amount (or Annual Rate): $ 384,746 Period Covered: 4/1/04 – 3/31/08

Location of Activity: Xavier University

Person-Months or % of Effort Committed to the Project: _____Cal Yr 25% Acad 1 month Summ

---

Status of Support: __X_Current ___Pending ___Submission Planned in Near Future

Contract Number/Proposal Title: Training HBCU Faculty and Students in Prostate Cancer (PC) Research: Cross-talk between apoptotic signaling pathways: Role in biracial population in prostate cancer. Co-PIs. Dr. S. K. Ireland and Dr. Asim Abdel-Mageed (Tulane).

Source of Support: Department of Defense. Contract number: 06-21C964122520-010B

Award Amount (or Annual Rate): $ 312,523 Period Covered: 3/1/04 – 2/28/08

Location of Activity: Xavier University and Tulane University

Person-Months or % of Effort Committed to the Project: _____Cal Yr 25% _Acad 1 month Summ

---

Status of Support: __X_Current ___Pending ___Submission Planned in Near Future

Contract Number/Proposal Title: Response of Soy Cultures to Biological Elicitors

Source of Support: U.S. Department of Agriculture. Contract number 59-6435-2-0021.

Award Amount (or Annual Rate): $ 150,000 Period Covered: 5/1/04 – 4/31/07

Location of Activity: Xavier University

Person-Months or % of Effort Committed to the Project: _____Cal Yr 10% Acad _____Summ

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Status of Support: X___Current ___Pending ___Submission Planned in Near Future

Contract Number/Proposal Title: "Planning Grant Minority Institution/Cancer Center Collaboration". PI- Dr. K. Kennedy, COP, Xavier. Co-PIs. Dr. S. K. Ireland and Dr. Asim Abdel-Mageed (Tulane) for the individual pilot project "Molecular Determinants of Prostate Cancer Progression in African American Men"

Source of Support: **NIH NCI**. Contract number P20 CA118767-01.

Award Amount (or Annual Rate): $ 299,071 Period Covered: 9/30/07 - 9/29/09

Location of Activity: Xavier University and Tulane University

Person-Months or % of Effort Committed to the Project: _____Cal Yr _20%_Acad _____Summ

(Form 5, rev.2006)

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and consultants and collaborators. Begin with the principal investigator/program director. Photocopy this page for each person.

Name **DEIDRE DUMAS LABAT, PH.D.**	Position Title: **BIOLOGY PROFESSOR**

EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training.

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Newcomb College	BS	1963-1966	Biology
Xavier University of Louisiana	BS	1962-1963	
Tulane University	MS	1968-1969	Developmental Biology
University of New Orleans	MS	1967-1968	
Johns Hopkins University	MS	1966-1967	
Louisiana State University Medical Center Graduate School	Ph.D.	1973-1976	Major: Developmental Microbiology Minor: Virology/Molecular Biology

RESEARCH AND PROFESSIONAL EXPERIENCE: Starting with present position, list, in reverse chronological order, previous relevant employment,experience, and honors. Key personnel includes the principal investigator and any other individuals who participate in the development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in reverse chronological order, the titles, all authors, and complete references to pertinent publications during the past five years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

PROFESSIONAL EXPERIENCE

August 2006	Professor of Biology
Sept 1997-August 2005	Senior Vice President, Academic Affairs, Xavier University of Louisiana
July 1995-Sept 1997	Dean, College of Arts & Sciences, Xavier University of Louisiana
July 1992-1995	Associate Dean, College of Arts & Sciences, Xavier University of Louisiana
August 1989-Present	Professor of Biology Department, Xavier University of Louisiana

Aug. 1988-Present	Director, Howard Hughes Medical Institute Grant, Xavier University of Louisiana
August 1984-Sept 1990	Chairperson Biology Department, Xavier University of Louisiana
August 1983-August 1989	Associate Professor of Biology, Xavier University of Louisiana
Sept. 1979-August 1983	Assistant Professor of Biology, Xavier University of Louisiana

August 1978-June 1979 Assistant Professor of Biology, Dillard University

PUBLICATIONS

JW Carmichael, Jr., Jacqueline T. Hunter, Deidre D. Labat, John P. Sevenair, Lester W. Jones, Harold A. Vincent and Joanne A. Bauer. "A Longitudinal Assessment of a Problem-Solving Based High School/College Bridge Program to Serve Black Americans in Health Careers," (in preparation).

JW Carmichael, Jr., Deidre D. Labat, Jacqueline T. Hunter and John P. Sevenair. 1998. "Pathway to the Sciences at Xavier University of Louisiana" The GRE, FAME Report Volume 1: 19-26.

JW Carmichael, Jr., Jacqueline T. Hunter, Deidre D. Labat, J. Ann Privett and John P. Sevenair. "Minorities in the Biological Sciences – the Xavier Success Story and Some Implications" 1993. Bioscience 43, No. 8: 564-70

JW Carmichael, Jr., Jacqueline T. Hunter, Deidre D. Labat and John P. Sevenair. 1993. "An Educational Pipeline into Biomedical Sciences for African Americans" Collaborative Learning Exchange, 5-7.

JW Carmichael, Jr., Joanne Bauer, Jacqueline T. Hunter, Deidre D. Labat and John P. Sevenair. 1992. "An Educational Pipeline into Pharmacy for Minority Students" a chapter in Multicultural Pharmaceutical Education, a special issue of the Journal of Pharmacy Teaching, Vol. 3, Number 2: 73-82, Haworth Press, New York.

JW Carmichael, J.D. Bauer, J.T. Hunter, D.D. Labat, J.A. Privett and J.P. Sevenair for Minority Students, "An Educational Pipeline into Pharmacy for Minority Students" Journal of Pharmacy Teaching, accepted for publication.

Carmichael, Jr., JW, Joanne Bauer, Jacqueline T. Hunter, Deidre D. Labat, and John P. Sevenair. 1989. An Assessment of a Pre-Medical Program in Terms of Its Ability to Serve Black Americans. Journal of the National Medical Association 80, No. 10: 1094-1104.

Grace, Marcellus, JW Carmichael, Jr., Jacqueline T. Hunter Deidre D. Labat, and John P. Sevenair. An assessment of the ability of a pre-pharmacy program to serve Black Americans. Journal of the National Pharmaceutical Association 33, No. 1: 23-29.

BIOGRAPHICAL SKETCH	
Provide the following information for the key personnel and consultants and collaborators. Begin with the principal investigator/program director. Photocopy this page for each person.	
Name Peter J. Martinat	Position Title Associate Professor

EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training.

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Michigan State University, East Lansing	BS	1975	Entomology
	MS	1977	Entomology
College of Environmental Science and Forestry, State University of New York, Syracuse.	PhD	1984	Forest Entomology
West Virginia University, Morgantown	Postdoctoral Research	1985 - 1986	Forest Entomology

RESEARCH AND PROFESSIONAL EXPERIENCE: Starting with present position, list, in reverse chronological order, previous relevant employment, experience, and honors. Key personnel includes the principal investigator and any other individuals who participate in the development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in reverse chronological order, the titles, all authors, and complete references to pertinent publications during the past five years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

PROFESSIONAL HISTORY

August 1991 to Present. Associate Professor, Biology. Xavier University of Louisiana, New Orleans.

May 1987 to July 1991. Research Entomologist, Abbott Laboratories, Chemical and Agricultural Products Division. North Chicago, Ill. Biological pesticide research and development.

March 1985 to December 1986. Post-Doctoral Research Associate. Division of Forestry, West Virginia University, Morgantown. Pesticide ecological effects and field toxicology.

September 1981 to February 1985. Research Associate. Department of Entomology, University of Maryland, College Park. Ecology of forest Lepidoptera, insect host-parasite interactions.

June 1977 to September 1981. Graduate Assistant, Department of Environmental and Forest Biology, CESF, SUNY.

August 1975 to December 1976. Graduate Assistant, Teaching and Research. Department of Entomology, Michigan State University.

RECENT PUBLICATIONS

2005. K. H. Watanabe, H-I Lin, H. L Bart, P. Martinat, J. Means , M. Kunas, and D.A. Grimm.. *Bayesian estimation of kinetic rate constants in a food web model of polycyclic aromatic hydrocarbon bioaccumulation*. Ecological Modeling, 181 (2005): 229-246

1998. Bart, H.L., P.J. Martinat, A. Abdelghani, P. Tchounwou, and S.Taylor. Influence of taxonomy, ecology, and seasonality in river stage on fish contamination risks in floodplain swamps of the lower Mississippi river. *Ecotoxicology*. 7: 325-334.

1997.Martinat, P.J., J. D. Solomon, and T. D. Leininger. *Survivorship, Development, and Fecundity of Buck Moth, Hemileuca maia (Lepidoptera: Saturniidae) on Fourteen Common Tree Species in the Gulf Coast Urban Forest*. J. Entomol. Science.32 (2): 192-203.

1993. Martinat, P.J. , D. T. Jennings, and R. C. Whitmore. Effects of diflubenzuron on the litter spider and orthopteroid community in a central appalachian forest infested with gypsy moth (Lepidoptera: Lymantriidae). Env. Entomol. 22(5): 1003-1008.

1990. Barbosa, P., J. Kemper, P. Gross, and P. Martinat. Influence of dietary nicotine and colony source of *Manduca sexta* (Lepidoptera: Sphingidae) on its suitability as a host of *Cotesia congregata* (Hymenoptera: Braconidae). Entomophaga 35(2): 223-231.

1990. Cooper, R. J., P. J. Martinat, and R. C. Whitmore. Dietary similarityamong insectivorous birds: influence of taxonomic versus ecological categorization of prey. Studies in Avian Biology 13: 104-109.

1990. Cooper, R. J., K. M. Dodge, P. J. Martinat, S. B. Donahue, and R. C. Whitmore. Effect of diflubenzuron application on eastern deciduous forest birds. J. Wildl. Manag. 54(3): 486-493.

1989. Martinat, P. J., and D. C. Allen. Response of saddled prominent, *Heterocampa guttivitta* (Walker) (Lepidoptera: Notodontidae) pupae to desiccation, cold treatment, and post-cold treatment incubation temperature. Gr. Lakes Entomol. 22: 57-63.

1988. Martinat, P. J., and D. C. Allen. Behavior of saddled prominent, *Heterocampa guttivitta* (Walker) (Lepidoptera: Notodontidae), larvae in a northern hardwood forest. J. New York Entomol. Soc. 96:470-478.

1988. Martinat, P. J., and D. C. Allen. Saddled prominent (Lepidoptera: Notodontidae) outbreaks in North America. N. J. Appl. For. 5: 88-91

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and consultants and collaborators. Begin with the principal investigator/program director. Photocopy this page for each person.

Name	Position Title
Joseph Ross	Associate Professor of Biology

EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training.

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Rhodes College, Memphis, TN	BS	1979	Biology
Louisiana State U. Baton Rouge, LA	Ph.D.	1983	Microbiology
University of Fla. College of Medicine, Gainesville, Fla	Postdoctoral Assoc.	1983-84	Biochemistry
University of Fla. College of Vet. Medicine, Gainesville, Fla.	Assistant In	1984-85	Pathology
St. Jude Children's Research Hospital, Memphis, TN	Postdoctoral Fellow	1985-86	Virology

RESEARCH AND PROFESSIONAL EXPERIENCE: Starting with present position, list, in reverse chronological order, previous relevant employment, experience, and honors. Key personnel includes the principal investigator and any other individuals who participate in the development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in reverse chronological order, the titles, all authors, and complete references to pertinent publications during the past five years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

Chair, Department of Biology, Xavier University of Louisiana, New Orleans, Louisiana June 1998 to 2004.
Associate Professor, Department of Biology, Xavier University of Louisiana, New Orleans, Louisiana, 1995 to present;
Assistant Professor, Department of Biology, Xavier University of Louisiana, New Orleans, Louisiana, 1988-1995;
Instructor, Science Department, Memphis Catholic High School, Memphis Tennessee, 1987- 1988
Adjunct Assistant Professor, Department of Biology, Christian Brothers University, Memphis, Tennessee, Summer, 1987;

PUBLICATIONS:

1. Chapman, Charles P., J. F. Ross, and M. Orlowski. 1991. Regulation of macromolecular synthesis during nutritional shift-up in the fungus *Mucor*. *Current Microbiology* **22**:321-325

2. Ross, J.F. and M. Orlowski. 1982. Regulation of ribosome function in the fungus *Mucor:* growth rate vis-a-vis dimorphism. *FEMS Microbiol. Lett.* **13**:325-328.

3. Ross, J. F. and M. Orlowski. 1982. Growth-rate-dependent adjustment of ribosome function in chemostat-grown cells of the fungus *Mucor racemosus*. *J. Bacteriol.* **149**:650-653.

4. Orlowski, M. and J. F. Ross. 1981. Relationship of internal cyclic AMP levels, rates of protein synthesis and *Mucor* dimorphism. *Arch. Microbiol.* **129**: 353-356.

ABSTRACTS:

1. Mondecar, J. Bender, J. Ross, W. George and J. Preslan. 1993.. Removal of TNT from Contaminated water with Microbial Mats. *The Second International symposium on* in Situ *and On-site Reclamation*. San Diego, California.

2. Mondecar, M., J. Bender, J. Ross, W. George and K. Dummons. 1992. Bioremediation of TNT by a Mixed Microbial Ecosystem. *Abstr. Ann. Meet. ASM.*

3. Ross, J. F. and M. Orlowski. 1983. Regulation of macromolecular synthesis in the fungus *Mucor* during nutritional shift-up. *Abstr. Annu. Meet. ASM.*

4. Ross, J. F. and M. Orlowski. 1981. Regulation of protein synthesis in *Mucor*: growth rate vis-a-vis dimorphism. *Abstr. Annu. Meet. So. Centr. Branch ASM.*

5. Ross, J. F. and M. Orlowski. 1981. Regulation of the peptide chain elongation rate as a function of growth rate in chemostat-grown cells of the fungus *Mucor racemosus*. *Abstr. Annu. Meet. ASM.*

6. Ross, J. F. and M. Orlowski. 1980. Regulation of the peptide chain elongation rate as a function of growth rate in chemostat-grown cells of the fungus *Mucor*. *Abstr. Annu. Meet. So. Centr. Branch ASM.*

BIOGRAPHICAL SKETCH	
Provide the following information for the key personnel and consultants and collaborators. Begin with the principal investigator/program director. Photocopy this page for each person.	
Name Michelle Bell Boissiere, Ph.D.	Position Title Assistant Professor, Department of Biology

EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training.

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Xavier University of Louisiana, (NOLA)	Bachelor of Science	1986	Biology
Tulane University (NOLA)	Master of Science	1989	Biology
Tulane University (NOLA)	Doctor of Philosophy	1994	Cell and Molecular Biology

RESEARCH AND PROFESSIONAL EXPERIENCE: Starting with present position, list, in reverse chronological order, previous relevant employment, experience, and honors. Key personnel includes the principal investigator and any other individuals who participate in the development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in reverse chronological order, the titles, all authors, and complete references to pertinent publications during the past five years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

Employment

January 1994 – present: Assistant Professor, Department of Biology, Xavier University of Louisiana

May 2004 – August 2006: Chair, Department of Biology, Xavier University of Louisiana

January 2001 – August 2003: Director, Center for Undergraduate Research, Xavier University of Louisiana

Annually (June – August) 1996 - 2000: Director, BIOSTAR Summer Science Academy Program for High School Students, Xavier University of Louisiana

Relevant Professional Experiences (selected)

August 2005: Proposal Development Team Member – The Institute for Capacity Building, a unit of the United Negro College Fund. Washington, D.C.

August 2004: Invited Presentation - "Attracting and Preparing Minority Students for Careers in the Biomedical Sciences". Presented at the symposium on *Changing the Face of the Genetics Counseling Profession,* sponsored by the Center for Environmental Genetics at the University of Cincinnati. Hueston Woods, Cincinnati.

May 2004: Invited Presentation – "Preparing Students for a Rigorous Science Curriculum". Presented at the conference : *Exceeding Expectations – Supporting High School Students to Do College Work*, co-sponsored by the Bill and Melinda Gates Foundation and by Jobs For The Future. New Orleans, Louisiana.

August 2003: Grant Reviewer – Proposals submitted to the National Science Foundation GK12BIOL Program. Arlington, Virginia.

August 2003 – August 2004: Task Force Member - New Orleans Regional Task Force on Economic Development and Health Workforce Training, commissioned by the State of Louisiana Department of Economic Development. New Orleans, Louisiana.

January 2003: Invited Presentation - "Leading the Nation in Medical School Placement: Xavier University's Premedical Preparation Program". Presented at the *Clemson University National Conference on Best Practices in Black Student Achievement.* Clemson, South Carolina.

December 2001: Publication – "Artistically Inclined Students should be encouraged to Pursue Careers in Science". *American Biology Teacher volume 63, # 9, December 2001.*

October 2000: Program Reviewer – Morgan State University science education program, funded by HCOP. Baltimore, Maryland.

May 2001: Workshop Presider – "Developing Successful Science Education Programs". The workshop was hosted by St. Francis College, Brooklyn, New York.

August 1999: Invited Presentation – "Creating A Community of Active Learners". Presented as the Keynote Address for the Bowie State University Faculty Development Seminar. Bowie, Maryland.

BIOGRAPHICAL SKETCH			
Provide the following information for the key personnel and consultants and collaborators. Begin with the principal investigator/program director. Photocopy this page for each person.			
Name Tanya K. McKinney		Position Title Assistant Professor of Biology	
EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training.			
INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Tougaloo College, Tougaloo, MS	Bachelor of Science	1989	Biology
Univ. of Alabama at Birmingham, Birmingham, AL	Ph.D	1996	Microbiology
Virginia Commenwealth Univ. Richmond, VA.	Post-doctoral Training	1996-2000	Microbiology

RESEARCH AND PROFESSIONAL EXPERIENCE: Starting with present position, list, in reverse chronological order, previous relevant employment, experience, and honors. Key personnel includes the principal investigator and any other individuals who participate in the development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in reverse chronological order, the titles, all authors, and complete references to pertinent publications during the past five years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

A. Positions and Honors.

Positions and Employment

Summer 1987	Research Intern, Purdue University Summer Research Program, West Lafayette, IN.
1987-1988	Minority Access to Research Careers (MARC) Research Intern, Department of Biochemistry, University of Mississippi Medical Center, Jackson, MS.
Summer 1998	Research Intern, NIH, NIDDK Summer Research Internship Program, NIH, NIDDK, Bethesda, MD.
1988-1989	MARC Research Intern, Department of Biochemistry, University of Mississippi Medical Center, Jackson, MS.
1996-2000	Postdoctoral Fellow, Division of Infectious Diseases, Department of Medicine, Virginia Commonwealth University, Medical College of Virginia, Richmond, Virginia.
2000-	Assistant Professor, Department of Biology, Xavier University of LA,
2002-2005	Assistant Professor, Department of Environmental Health Science, Tulane University, New Orleans, LA. New Orleans, LA.

Honors

1985	Presidential Scholar, Tougaloo College, Tougaloo, MS.
1987-1989	MARC Fellow, Tougaloo College, Tougaloo, MS.
1989-1996	Comprehensive Minority Faculty Development Fellow, University of Alabama at Birmingham, Birmingham, AL.
1991-1994	National Science Foundation Minority Pre-Doctoral Fellow, University of Alabama at Birmingham, Birmingham, AL.
1999	Alternate, UNCF-Merck Post-Doctoral Science Research Fellowship. Virginia Commonwealth University, Medical College of Virginia, Richmond, Virginia.

BIOGRAPHICAL SKETCH	
Provide the following information for the key personnel and consultants and collaborators. Begin with the principal investigator/program director. Photocopy this page for each person.	
Name HEMA A. BANDARANAYAKE	Position Title **Assistant Professor,**

EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training.

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
University of Peradeniya, Peradeniya, Sri Lanka	B.Sc. in Agriculture	September 1981	Genetics & Plant Breeding.
University of Maryland at College Park, Maryland.	Ph.D.	May 1992	Plant Molecular Genetics.
Department of Botany, University of British Columbia, Vancouver, British Columbia, Canada.	**Postdoctoral Fellow**		Molecular Biology of Photosynthetic electron transport mutants of *Arabidopsis thaliana.*
Department of Biology, Virginia Polytechnic Institute & State University, Blacksburg, Virginia	**Postdoctoral Research Associate**		Characterization of *Beta glucosidase* genes of Maize and their temporal and spatial expression.

RESEARCH AND PROFESSIONAL EXPERIENCE: Starting with present position, list, in reverse chronological order, previous relevant employment, experience, and honors. Key personnel includes the principal investigator and any other individuals who participate in the development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in reverse chronological order, the titles, all authors, and complete references to pertinent publications during the past five years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

PROFESSIONAL EXPERIENCE:

- August 2001 to present
  Assistant Professor, Department of Biology, Xavier University of Louisiana, New Orleans, Louisiana.
- August 1996 to July 2001
  Assistant Professor (Adjunct), Department of Biology, Radford University, Radford, Virginia.
- January 1995 to July 1996
  Postdoctoral Research Associate, Department of Biology, Virginia Polytechnic Institute & State University, Blacksburg, Virginia
- January 1993 to December 1994
  Postdoctoral Fellow, Department of Botany, University of British Columbia, Vancouver, British Columbia, Canada.
- January 1992 to December 1992
  Assistant Instructor, Department of Botany, University of Maryland, College Park, Maryland.

AWARDS:

- **College of Arts & Science Award** for the laboratory teacher of the year: 2005, Xavier University of Louisiana, New Orleans.

- **Jane Pritchard Award** for outstanding teaching, University of Maryland, College Park in 1988.

Contributions to the General Biology program at Xavier University:

- Worked to move the General Biology workbook from a printed version to an electronic version available through Blackboard.
- Developed a interactive version of questions from the general Biology work book, and made it available online through Blackboard.
- Working with the Center for the Advancement of Teaching to use animations in General Biology to enhance student le Made these animations of life processes available to students through Blackboard.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed for Form Page 2.
Follow the sample format for each person. **DO NOT EXCEED FOUR PAGES.**

Comment [JG1]: For any page on which you wish to edit a Header or Footer, select "Unprotect Document" under the Tools menu, double-click in the Header/Footer, and enter text. Re-protect forms: Select "Protect Document for FORMS" under the Tools menu.

NAME	POSITION TITLE
Betty Cecile Brookover	Assistant Professor Department of Psychology

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Southern Illinois University, Carbondale, IL	BA	1974	English Literature
Tulane University, New Orleans, LA	MBA	1978	Business
University of New Orleans, New Orleans, LA	MS	1995	Psychology
University of New Orleans, New Orleans, LA	PhD	1997	Psychology

EMPLOYMENT HISTORY

Current - Assistant Professor, Department of Psychology, Xavier University of Louisiana, New Orleans, LA.

1997-1999 – Instructor, Departments of Psychology & Human Performance & Health Promotion, University of New Orleans, New Orleans, LA.

1993-1999 – Director, The Rosa Keller Campus, an older adult education program, New Orleans, LA.

RESEARCH PUBLICATIONS AND PRESENTATIONS

Brookover, B. C. (August, 2005). *An Introduction to Program Evaluation.* Training Minority Scientists: Exploring Partnerships, Expanding Opportunities. Center for Bioenvironmental Research/Tulane Health Sciences Center.

Brookover, B. C., O'Hanlon, A. M., Millet, L., & Carson, J. (2006). *Older Adult Motivation for Participation in a Mini-Course Format.*

Brookover, B. C. (November, 2004). *Attitudes of African American College Students toward Older Adult Love Styles.* Gerontological Society of America.

O"Hanlon, A. M., Brookover, B. C., & Cropley, L. (November, 2004). *Church-based Activity, Support, and Health in Older Episcopalians.* Gerontological Society of America

Brookover, B. C. and McKee, J. (2003). *Love and Marriage: Attitudes and Beliefs of African American College Students.* Society for the Study of Human Development annual conference, Harvard University, Cambridge, MA.

O'Hanlon, A. M., Brookover, B. C., and Cropley, L. (December, 2003). *Report of the Needs Assessment of Older Parishioners in the Diocese of Louisiana.* Bremenstul Associates, Inc.

O'Hanlon, A.M., Brookover, B. C., and Cropley, L. (2003). Assessing Needs in Older Adults: Results using the PATCH model in an Episcopal Diocese. Gerontological Society of America. San Diego, CA.

Brookover, B. C., O'Hanlon, A. M., and Cropley, L. (2003). The PATCH Model: An application in developing a needs assessment for an Episcopal Diocese. Conference presentation for Building Partnerships for a Healthy New Orleans, Charity School of Nursing, Delgado Community College, New Orleans, LA.

Brookover, B. C. and Mason, B. (November, 2002). Assessing changes in African-American attitudes about aging: Personal beliefs and standardized measures. Gerontological Society of America. Boston, MA.

Diez, K., O'Hanlon, A. M., and Brookover, B. C. (November, 2002). The Effects of Cognitive Restructuring Techniques on Self-Efficacy for Physical Activity in Older Adults. Gerontological Society of America. Boston, MA.

O'Hanlon, A. M. and Brookover, B. C. (2002). Assessing changes about aging: Personal reflections and a standardized measure. *Educational Gerontology, 28,* 711-725.

O'Hanlon, A. M., Brookover, B. C., and Cropley, L. (July, 2002). *Interim Report of the Needs Assessment of Older Parishioners in the Diocese of Louisiana.* Bremenstul Associates, Inc.

O'Hanlon, A. M. and Brookover, B. C. (November, 2000). Life reflections: Self and gender roles, racial group, personal identity, and adaptations to aging. Gerontological Society of America. Washington, D. C.

Guthans, S. and Brookover, B. C. (November, 1998). Growing older in New Orleans: A needs assessment in an urban setting. Gerontological Society of America., Philadelphia, PA.

Brookover, B. C. and Porter, R. J. (April, 1998). A memory intervention program for older adults. Cognitive Aging Conference. Atlanta, GA.

Camp, C. J. and Brookover, B. C. (1997). Learning about older learners: Training undergraduates as researchers. Educational Gerontology, 23, 809-813.

Brookover, B. C. and Porter, R. J. (November, 1996). Lifelong learning: A pathway to successful aging. Gerontological Society of America. Washington, D. C.

Brookover, B. C., Porter, R. J., and Camp, C. J. (November, 1996). Minority recruitment for an older adult education program. Gerontological Society of America. Washington, D. C.

Brookover, B. C. (November, 1994). Motivations for participation in an older adult education program. Gerontological Society of America. Washington, D. C.

PROGRAM EVALUATIONS

Grant Award for a Needs Assessment of Older Parishioners (2002), Episcopal Diocese of Louisiana, Co-PI ($50,000), am donating my time on this grant in order to receive data

Program evaluator for MBRS SCORE, RISE, AND MARC Grants, Xavier University of New Orleans, New Orleans, LA., 2001 to the present.

Research Committee Member, Needs Assessment for Orleans Parish Older Adults performed as activity of Elder Action Committee and New Orleans Council on Aging, 1996.

Brookover, B. C. and Heller, S. S. (1996). Program evaluation for the University of New Orleans Petite Privateer Day Care Center.

HONORS AND AWARDS

Student Research Award Finalist (1996), Gerontologist Society of America (GSA), Behavioral and Social Sciences Section

Outstanding Graduate Student Commendation (1997), Department of Psychology, University of New Orleans

RESEARCH SUPPORT

Ongoing research support

MBRS-RISE Program at Xavier University of LA, Program Evaluator-Dr. B. C. Brookover, PD-Dr. C. L. Klein Stevens. The major goals of this program are to promote interest of African American students in biomedical research careers, strengthen student research competence, and better prepare RISE students for graduate school, 05/01/02 – 04/30/06.

MBRS-SCORE Program at Xavier University of LA, Program Evaluator-Dr. B. C. Brookover, PD-Dr. C. L. Klein Stevens. The major goals of this program are to increase scientific competitiveness and research capability of science faculty at Xavier by providing research funds for scientific subprojects, 04/01/04 – 03/31/08.

MARC Program at Xavier University of LA, Program Evaluator-Dr. B. C. Brookover, PD-Dr. Teresa Birdwhistell, The major goals of this program are to promote interest of African American students in biomedical research careers, strengthen student research competence, and better prepare RISE students for graduate school, 06/01/03 – 05/31/07.

Xavier Center for Advancement of Teaching Research Communities Initiative, PI-Dr. B. C. Brookover, 01/10/05 – 08/15/05.

Completed research support

Grant Award for a Needs Assessment of Older Parishioners (2002), Episcopal Diocese of Louisiana, Co-PI

College of Education Committee on Organized Research, University of New Orleans, *Life Stories and Health Practices of Older Adults*, 1999, Ann O'Hanlon, Ph.D., Principle Investigator, and Cecile Brookover, Ph.D., co-author of grant.

Mary Freedom Wisdom Foundation, Grant awarded to the Rosa Keller Campus, 1999, Co-author of grant along with Linda Morgan of Touro Infirmary.

Keller Family Foundation, Grant awarded to the Rosa Keller Campus, 1998, Co-author of grant along with Linda Morgan of Touro Infirmary.

Louisiana State Department of Education, 1995, Grant awarded to Benjamin Franklin Elementary Magnet School. Author of grant.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and consultants and collaborators. Begin with the principal investigator/program director. Photocopy this page for each person.

Name: Dr. Willie Pearson Jr.	Position: Title Professor and Chair, School of History, Technology and Society, Georgia Institute of Technology.

EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training.

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Wiley College	BA	1968	Major: Sociology Minor: Economics
Atlanta University	MA	1971	Sociology
Southern Illinois University, Carbondale	Ph.D.	1981	Sociology

RESEARCH AND PROFESSIONAL EXPERIENCE: Starting with present position, list, in reverse chronological order, previous relevant employment, experience, and honors. Key personnel includes the principal investigator and any other individuals who participate in the development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in reverse chronological order, the titles, all authors, and complete references to pertinent publications during the past five years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

PROFESSIONAL HISTORY:

2001 to Present: Professor and Chair, School of History, Technology and Society, Georgia Institute of Technology, Atlanta, GA

1997-2001: Wake Forest Professor of Sociology, Department of Sociology, Wake Forest University, Winston-Salem, NC

1988-1997: Professor to Wake Forest Professor of Sociology, Department of Sociology, Wake Forest University, Winston-Salem, NC

1984-1988: Associate Professor, Department of Sociology, Wake Forest University, Winston-Salem, NC

1980-1984: Assistant Professor, Department of Sociology, Wake Forest University, Winston-Salem, NC

RECENT PUBLICATIONS:

Pearson,W., Jr. 2002 "Advancing Minorities in Science and Engineering Careers," In Peggy Layne, Editor. Diversity in Engineering: Managing the Workforce of the Future. Washington, D.C.: National Academy Press.

Chubin, D. E. and W. Pearson, Jr. 2002 "Policy For Science, People For Science." Technology in Science. 24:145-154.

Bechtel, K. H. and W. Pearson, Jr.. 2000 "Scientific Deviance." Encyclopedia of Criminology and Deviant Behavior Vol. II. Philadelphia: Taylor and Francis.

W. Pearson, Jr. 1999 "Policy." Pp 311-313. In George Campbell, Jr., Ronni Denes and Catherine Morrison, Editors, Access Denied: Race, Ethnicity and the Scientific Enterprise. New York: Oxford University Press.

W. Pearson, Jr., C. NESS and E. HOBAN. 1999 "Race, Gender and the Baccalaureate Origins of Ph.D. Chemists." Journal of Women and Minorities in Science and Engineering. 5:97-111.

W. Pearson, Jr.. and C. B. Leggon. 1999 "African American Chemists: A Missing Chapter in the Sociology of Science." Knowledge And Discourse Conference Proceedings. Refereed Paper. Hong Kong. (http://ec.hku.hk/kd96proc/authors/papers/pearson.htm) and CD-

ROM.

Pearson,W., Jr. 1997 "Educational and Career Experiences of African American Ph.D. Scientists." Pp 28-31. In National Science Foundation, Building Diversity in the Scientific Workforce. Arlington, VA, NSF 98-37.

Pearson,W., Jr. and I. Warner 1997 "Mentoring Experiences of African American Ph.D. Chemists." Chapter 4 in Henry T. Frierson, Jr., Editor. Diversity in Higher Education: Volume III: Examining Mentoring-Protégé Experiences. Greenwich, CT. JAI Press.

Leggon, C. and W. Pearson, Jr.. 1997 "The Baccalaureate Origins of African American Female Ph.D. Scientists." Journal of Women and Minorities in Science and Engineering. 3:213-224.

Hendrix, L. and W. Pearson, Jr. 1995 "Spousal Interdependence, Sexual Inequality and Divorce: A Cross-Cultural Press Examination." Journal of Comparative Family Studies. 26:217-232.

Pearson,W., Jr. 1995 "St. Elmo Brady"; "Chemistry", "Percy L. Julian"; and "Mortality and Morbidity". In Charles V. Hamilton and Jack Salzman, Editors, Encyclopedia of African American Culture and History. New York: Macmillan.

Leggon, C. and W. Pearson, Jr.. 1994 "Who Will do Science?" Pp. 77-88. In Leticia Mayer and Roberto Varela, Editors. Los Grandes Problemas de la Ciencia y la Technología Condiciones y retos para la investigación científica y technológica. Mexico City: Universidad Nacional Autonoma De
Mexico.

Anderson, B.T., W. Pearson, Jr. and B. Brushi. 1994 "Minority Females and Precollege Mathematics and Science." Equity & Excellence in Education. 27:62-70.

Corbett, K., C. Gentry and W. Pearson, Jr. 1993 "Sexual Harassment in High School." Youth and Society. 25:93-103.

Hrabowski, F. A., III and W. Pearson, Jr. 1993 "Recruiting and Retaining Talented African American Males in College Science and Engineering." Journal of College Science Teaching. 22:234-238.

1992 Reprinted in National Science Teachers Association, Science for All Cultures. Arlington, VA: National Science Teachers Association.

Thomas,G. E., Clewell, B. C. and W. Pearson, Jr. 1992 "A Case Study of Major Doctoral Producing Institutions in Recruiting, Enrolling, and Retaining Black and Hispanic Graduate Students". In Jessie M. Jones, Margaret E. Gertz and Charlotte V. Kuh, Editors. Minorities in Graduate Education: Pipeline, Policy and Practice. Princeton: Educational Testing Service.

BIOGRAPHICAL SKETCH	
Provide the following information for the key personnel and consultants and collaborators. Begin with the principal investigator/program director. Photocopy this page for each person.	
Name: **HARISH RATNAYAKA**	Position Title: **ASSISTANT PROFESSOR, DEPT. OF BIOLOGY, XAVIER UNIVERSITY OF LOUISIANA**

EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training.

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
University of Peradeniya, Sri Lanka	B.Sc.	1983	Agriculture
University of Peradeniya, Sri Lanka	M.Phil.	1988	Agriculture
City University of New York, New York, New York Advisor: Dr. Dwight Kincaid	Ph.D.	1998	Biology
New Mexico State University PI/Advisor: Dr. Tracy Sterling	Postdoctoral Fellow	2000-2003	Oxidative stress tolerance in crop-weed interactions

RESEARCH AND PROFESSIONAL EXPERIENCE: Starting with present position, list, in reverse chronological order, previous relevant employment, experience, and honors. Key personnel includes the principal investigator and any other individuals who participate in the development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in reverse chronological order, the titles, all authors, and complete references to pertinent publications during the past five years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

Professional History

August 2003 to Present. Assistant Professor, Department of Biology, Xavier University of Louisiana.

October 2005 to January 2006. Sabbatical Research Scientist, Department of Biology, Trinity University, San Antonio.

April 2000 to July 2003. Postdoctoral Fellow, Department of Entomology, Plant Pathology and Weed Science, New Mexico State University.

September 1999 to April 2000. science Teacher, Thornton Donovan School, New Rochelle, New York.

September 1995 to August 1999. Adjunct Faculty, Department of Biological Sciences, Lehman College of the City University of New York.

September 1993 to August 1995. Graduate fellow, Department of Biological Sciences, Lehman College of the City University of New York.

May 1989 to July 1993. Research Officer, Natural Products Division, Ceylon Institute of Scientific and Industrial Research (CISIR, current Industrial Technology Institute), Colombo, Sri Lanka.

September 1988 to April 1989. Consultant, Marga Institute, Colonmbo, Sri Lanka.

September 1985 to August 1988. Graduate Scholar (M. Phil Candidate), Postgraduate Institute of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka.

September 1984 to August 1985. Assistant Lecturerk Department of Crop Science, University of Peradeniya, Peradeniya, Sri Lanka.

July 1983 to August 1984. Hoticulturist, Tropical Seed Company, Colombo, Sri Lanka.

PUBLICATIONS

Bettman GT, **Ratnayaka HH**, Molin WT, Sterling TM. 2006. Physiological and antioxidant responses of cotton and spurred anoda (*Anoda cristata*)under nitrogen deficiency. Weed Science 54:641-650.

Molin WT, Hugie JA, **Ratnayaka HH**, Sterling TM. 2006. Spurred anoda (*Anoda cristata*)competition in wide row and ultra narrow row cotton (*Gossypium hirsutum and G. barbadense*)management systems. Weed Science 54:651-657.

Ratnayaka HH, Kincaid D. 2005. Gas exchange and leaf ultrastructure of Tinnevelly senna (*Cassia angustifolia* Vahl)under drought and nitrogen stress. Crop Science 45:840-847.

Ratnayaka HH, Molin WT, Sterling TM. 2003. Physiological and antioxidant responses of cotton and spurred anoda under interference and mild drought. Journal of Experimental Botany 54:2293-2305.

Ratnayaka HH, Meurer-Grimes Bl Kincaide D. 2002. Sennoside yields in Tinnevelly senna affected by deflowering and leaf maturity. HortScience 37:768-772.

Barbarin AM*, Williams FJ*, Bettmann GT, Hauber DP, **Ratnayaka HH**. 2005. Gas exchange and antioxidant properties of two spinach (*Spinacia oleracea* L.)cultivars of contrasting morphology. HortScience 40:1057.

Ratnayaka HH, Molin WT, Sterling TM. 2003. Photosynthesis and antioxidant responses of cotton and spurred anoda under progressive drought. Weed Science Society of America Abstracts 43:53.

Ratnayaka HH, Meurer-Grimes B, Kincaid DT. 1998. Increasing sennoside yields in Tinnevelly Senna (*Cassia angustifolia* Vahl): Effects of drought, foliar nitrogen spray and crop type. Planta Medica 64:438-442.

Ratnayaka HH, Bandara KMC, Weerasinghe ASP. 1993. Cropping systems development with Solanum xanthocarpum in Mahaweli system C of Sri Lanka. Tropical Science 33:163-170.

Ratnayaka HH, Sangakkara UR. 1988. Cowpea (*Vigna unguiculata* Walp)as a component of alley cropping. Sri LankanJournal of Agricultural Science 25:75-82.
Williams FJ, Barbarin AM, Hauber DP, **Ratnayaka HH**. 20026. Drought acclimation of leaf gas exchange in Jalapeno and Big Chili Pepper. HortScience 41:1058.

INVOLVEMENT OF UNDERGRADUATE STUDENTS IN RESEARCH

Currently four Xavier undergraduates work with me on oxidative stress tolerance in spinach and pepper cultivars. This research is aimed at understanding antioxidative mechanisms induced under mild abiotic stress, and testing the feasibility of increasing quality of vegetable crops by changing growing conditions. During postdoctoral researchl I trained six undergraduates, and involved them in research on determining oxidative stress tolerance mechanisms in cotton cultivars and cotton weeds. The techniques mastered by the students included Infrared Gas Analysis, Chlorophyll Fluorescence, Spectrophotometry and High Performance Liquid Chromatography, among others.

BIOGRAPHICAL SKETCH	
Provide the following information for the key personnel and consultants and collaborators. Begin with the principal investigator/program director. Photocopy this page for each person.	
Name: **GARY DONALDSON**	Position: **Director, Center for Undergraduate Research**

EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training.

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Western Kentucky University, Bowling Green, Kentucky	BS	1973	American History
Western Kentucky University, Bowling Green, Kentucky	MS	1975	American History
Louisiana State university	Ph.D.	1983	History

RESEARCH AND PROFESSIONAL EXPERIENCE: Starting with present position, list, in reverse chronological order, previous relevant employment, experience, and honors. Key personnel includes the principal investigator and any other individuals who participate in the development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in reverse chronological order, the titles, all authors, and complete references to pertinent publications during the past five years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

PROFESSIONAL HISTORY

2005 to Present. Director, Center for Undergraduate Research

2005 TO Present. Keller Foundation Professorship in American History (Endowed Chair).

2004 to Present. Associate Director, Center for Undergraduate Research.

1998 to 2005. Louisiana State Board of Regents Scholar, John D. LaFarge Professorship in Social Justice (Endowed Chair).

1999 to Present. Professor of History

1993 to 1999. Associate Professor

1989 to 1993. Department Chair

1987 to 1993. Assistant Professor

PUBLICATIONS

2006. Modern America: *The Nation since 1945* (M.E. Sharpe)

2003. *Liberalism's Last Hurrah: The Presidential Campaign of 1964* (M.E. Sharpe)

2002. *American Foreign Policy: The Twentieth Century in Documents* (Longman)

1999. *Truman Defeats Dewey* (University of Press of Kentucky)

1997. *America At War Since 1945: Politics and Foreign Policy in Korea, Vietnam, and the Gulf War* (Praeger)

1996. *Abundance and Anxiety: America. 1945-1960* (Praeger)

1991. *A History of the African-American Soldier* (Krieger)

The Presidential Campaign of 1960 (completed to be published by Roman and Littlefield)

BIOGRAPHICAL SKETCH	
Provide the following information for the key personnel and consultants and collaborators. Begin with the principal investigator/program director. Photocopy this page for each person.	
Name **Isiah M. Warner**	Position Title **Professor-Analytical**

EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training.

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Southern University	BS	1968	
University of Washington	PHD	1977	

RESEARCH AND PROFESSIONAL EXPERIENCE: Starting with present position, list, in reverse chronological order, previous relevant employment, experience, and honors. Key personnel includes the principal investigator and any other individuals who participate in the development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in reverse chronological order, the titles, all authors, and complete references to pertinent publications during the past five years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

Awards and Honors:

2003: Council for Chemical Research Diversity Award

2003: American Association for the Advancement of Science Fellow

2003: ACS Award for Encouraging Disadvantaged Students into Careers in the Chemical Sciences

2002: Howard Hughes Medical Institute Professors Award

2000: LSU Distinguished Faculty Award

2000: CASE Professor of the Year

2000: AAAS Lifetime Mentor Award

2000: Eastern Analytical Symposium Award for Achievements in Analytical Sciences

2000: Listed in 18th Edition of Who's Who in the World

2000: Award for Achievements in Analytical Sciences

2000: Eastern Analytical Symposium Award for Achievements in the Fields of Analytical Sciences

2000: Carnegie Foundation for the Advancement of Teaching/CASE Louisiana Professor of the Year

1997: Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring

BOARD OF REGENTS SUPPORT FUND
POST-KATRINA SUPPORT FUND INITIATIVE, FISCAL YEAR 2006-07

BUDGET
PROJECT YEAR (CIRCLE ONE):
1 2 3 4 5 (√) Composite

Title of Proposed Project: PKSFI/Xavier Biothrust 21: Rebounding from Katrina and Producing a Larger, Better Prepared 21st Century, Biosciences Workforce for Louisiana

Principal Investigator(s): Dr. Shubha Kale Ireland

Institution(s) of Higher Education: Xavier University of Louisiana

I. PROPOSED BUDGET:

	Support Fund Money Requested*	Institutional Match**	Private Sector/ Other Match***
1. Research Salaries	$1,107,003.00	$ 728,485.00	$
2. Clerical Salaries	$		
3. Subtotal	$1,107,003.00		
4. Fringe Benefits (% of A.3)	$ 185,657.00		
5. Graduate Asst.			
6. Student(s)	$ 111,600.00		
7. Endowment(s)****			
8. Subtotal A	$1,404,260.00	$	
B. Supportive Expenses:			
1. Travel	$ 40,000.00	$	
2. Supplies	$ 15,000.00		
3. Consultants			
4. Rentals			
5. Printing	$		
6. Equipment	$ 14,525.00		
7. Other Expenses (Identify) Printing, Paper, Faxing, Conference Calls etc.			
a.	$ 14,000.00		
b.			
8. Subcontracts			
9. Subtotal B	$ 83,525.00	$	
C. Overhead:			
1.	NOT PERMITTED	$ 1,055,405.00	$
2. **Other Funded Projects that will support this proposal**		**$ 6,000,000.00**	
TOTAL PROJECT COST:	$1,487,785.00	$ 1,783,890.00	$ 6,000,000.00

*In the budget justification, distinguish between funds requested from the P-KSFI principal program and the Enhancement for Severely Impacted Institutions (ESIP). Note that ESIP funds may be used only at the institutions listed in Appendix A of this RFP.

**Stipulate whether in-cash or in-kind.

***The budget page(s) must reflect and the budget justification page(s) must explain any external funds that are claimed in the proposal. These funds must be itemized and their expenditure accounted for in the same manner as Support Fund money and institutional match. Refer to Section III.G of this RFP for details on matching requirements.

****Matching funds for the endowment of chairs may be requested through P-KSFI, though such requests must adhere to all regulations governing the BoRSF Endowed Chairs for Eminent Scholars Program.

Please see appendix I for detailed budget and budget narrative

PKSFI BUDGET

YEAR 1

	SUMMER SALARY	RELEASE TIME	ANNUAL SALARY	SUBTOTAL SALARIES	FRINGES	STUDENTS	TRAVEL	STUDENT FRINGES	EQUIPMENT	SUPPLIES	OTHER	TOTAL
IRELAND	7,000	0	0	7,000	1,120	0	0	0	0	3,000	500	11,620
CARMICHAEL	11,340	12,750	0	24,090	3,854	0	0	0	10,000	1,000	500	39,444
BANDARANAYAKE	5,700	13,390	0	19,090	3,054	0	0	0	0	0	0	22,144
ROSS	6,760	3,990	0	10,750	1,720	0	0	0	0	1,000	500	13,970
BOISSIERE	5,725	13,400	0	19,125	3,060	0	0	0	4,525	1,000	500	28,210
RATNAYAKA	5,780	13,000	0	18,780	3,005	0	0	0	0	0	0	21,785
MARTINAT	6,170	0	0	6,170	987	0	0	0	0	0	0	7,157
BROOKOVER	5,390	12,125	0	17,515	2,802	0	0	0	0	1,000	500	21,817
McKINNEY	6,111	0	0	6,111	978	0	0	0	0	0	0	7,089
COORDINATOR FOR BIOLOGY TUTORING	0	0	0	0	0	0	0	0	0	0	0	0
ASST. COOR.-TECH WRITER	0	0	0	0	0	0	0	0	0	0	0	0
STAFF SUPPORT	10,000	0	0	10,000	1,600	0	0	0	0	0	0	11,600
STUDENT TUTORS	0	0	0	0	0	0	0	0	0	0	0	0
STUDENT INTERNSHIPS	0	0	0	0	0	9,000	0	689	0	0	0	9,689
TRAVEL	0	0	0	0	0	0	8,000	0	0	0	0	8,000
CAT-ASSESS. SPEC.	0	0	35,000	35,000	5,600	0	0	0	0	0	0	40,600
CAT-GROUP LEADER	0	0	25,000	25,000	4,000	0	0	0	0	0	0	29,000
TOTAL	**69,976**	**68,655**	**60,000**	**198,631**	**31,781**	**9,000**	**8,000**	**689**	**14,525**	**7,000**	**2,500**	**272,125**
												272,125

YEAR 2

	SUMMER SALARY	RELEASE TIME	ANNUAL SALARY	SUBTOTAL SALARIES	FRINGES	STUDENTS	TRAVEL	STUDENT FRINGES	EQUIPMENT	SUPPLIES	OTHER	TOTAL
IRELAND	14,000	0	0	14,000	2,240	0	0	0	0	3,000	500	19,740
CARMICHAEL	11,680	13,140	0	24,820	3,971	0	0	0	0	1,000	500	30,291
BANDARANAYAKE	5,897	13,800	0	19,697	3,152	0	0	0	0	0	0	22,849
ROSS	13,918	14,170	0	28,088	4,494	0	0	0	0	1,000	500	34,082
BOISSIERE	11,800	13,800	0	25,600	4,096	0	0	0	0	1,000	500	31,196
RATNAYAKA	11,900	13,390	0	25,290	4,046	0	0	0	0	0	0	29,336
MARTINAT	6,355	14,290	0	20,645	3,303	0	0	0	0	0	0	23,948
BROOKOVER	5,550	12,490	0	18,040	2,886	0	0	0	0	1,000	500	22,426
McKINNEY	6,295	0	0	6,295	1,007	0	0	0	0	0	0	7,302
COORDINATOR FOR BIOLOGY TUTORING	12,225	0	52,000	64,225	10,276	0	0	0	0	0	500	75,001
ASST. COOR.-TECH WRITER	12,225	0	52,000	64,225	10,276	0	0	0	0	0	0	74,501
STAFF SUPPORT	10,000	0	0	10,000	1,600	0	0	0	0	0	0	11,600
STUDENT TUTORS	0	0	0	0	0	18,000	0	1,377	0	0	500	19,877
STUDENT INTERNSHIPS	0	0	0	0	0	9,000	0	689	0	0	0	9,689
TRAVEL	0	0	0	0	0	0	8,000	0	0	0	0	8,000
CAT-ASSESS. SPEC.	0	0	36,050	36,050	5,768	0	0	0	0	0	0	41,818
CAT-GROUP LEADER	0	0	25,750	25,750	4,120	0	0	0	0	0	0	29,870
TOTAL	**121,845**	**95,080**	**165,800**	**382,725**	**61,236**	**27,000**	**8,000**	**2,066**	**0**	**7,000**	**3,500**	**491,527**
												491,527

YEAR 3	SUMMER SALARY	RELEASE TIME	ANNUAL SALARY	SUBTOTAL SALARIES	FRINGES	STUDENTS	TRAVEL	STUDENT FRINGES	EQUIPMENT	SUPPLIES	OTHER	TOTAL
IRELAND	7,210	0	0	7,210	1,154	0		0	0	0	500	8,864
CARMICHAEL	6,015	13,540	0	19,555	3,129	0		0	0	0	500	23,184
BANDARANAYAKE	6,051	14,214	0	20,265	3,242	0		0	0	0	0	23,507
ROSS	0	0	0	0	0	0		0	0	0	0	0
BOISSIERE	6,080	14,214	0	20,294	3,247	0		0	0	0	500	24,041
RATNAYAKA	6,250	14,060	0	20,310	3,250	0		0	0	0	0	23,560
MARTINAT	6,545	14,700	0	21,245	3,399	0		0	0	0	0	24,644
BROOKOVER	5,720	12,865	0	18,585	2,974	0		0	0	1,000	500	23,059
McKINNEY	0	0	0	0	0	0		0	0	0	0	0
COORDINATOR FOR BIOLOGY TUTORING	12,590	0	53,560	66,150	10,584	0		0	0	0	500	77,234
ASST. COOR.-TECH WRITER	12,590	0	53,560	66,150	10,584	0		0	0	0	0	76,734
STAFF SUPPORT	0	0	0	0	0	0		0	0	0	0	0
STUDENT TUTORS	0	0	0	0	0	18,000		1,377	0	0	500	19,877
STUDENT INTERNSHIPS	0	0	0	0	0	10,800		826	0	0	0	11,626
TRAVEL	0	0	0	0	0	0	8,000	0	0	0	0	8,000
CAT-ASSESS. SPEC.	0	0	37,130	37,130	5,941	0		0	0	0	0	43,071
CAT-GROUP LEADER	0	0	0	0	0	0		0	0	0	0	0
TOTAL	**69,051**	**83,593**	**144,250**	**296,894**	**47,503**	**28,800**	**8,000**	**2,203**	**0**	**1,000**	**3,000**	**387,400**
												387,400

YEAR 4 (DISSEMINATION)	SUMMER SALARY	RELEASE TIME	ANNUAL SALARY	SUBTOTAL SALARIES	FRINGES	STUDENTS	TRAVEL	STUDENT FRINGES	EQUIPMENT	SUPPLIES	OTHER	TOTAL
IRELAND	14,852	16,710	0	31,562	5,050	0	0	0	0	0	500	37,112
CARMICHAEL	3,000	0	0	3,000	480	0	0	0	0	0	500	3,980
BANDARANAYAKE	3,000	0	0	3,000	480	0	0	0	0	0	0	3,480
ROSS	0	0	0	0	0	0	0	0	0	0	0	0
BOISSIERE	3,000	0	0	3,000	480	0	0	0	0	0	500	3,980
RATNAYAKA	2,320	0	0	2,320	371	0	0	0	0	0	0	2,691
MARTINAT	3,275	0	0	3,275	524	0	0	0	0	0	0	3,799
BROOKOVER	5,890	13,250	0	19,140	3,062	0	0	0	0	0	500	22,702
McKINNEY	0	0	0	0	0	0	0	0	0	0	0	0
COORDINATOR FOR BIOLOGY TUTORING	6,295	0	26,780	33,075	5,292	0	0	0	0	0	500	38,867
ASST. COOR.-TECH WRITER	6,295	0	26,780	33,075	5,292	0	0	0	0	0	0	38,367
STAFF SUPPORT	0	0	0	0	0	0	0	0	0	0	0	0
STUDENT TUTORS	0	0	0	0	0	18,000	0	1,377	0	0	500	19,877
STUDENT INTERNSHIPS	0	0	0	0	0	10,800	0	826	0	0	0	11,626
TRAVEL	0	0	0	0	0	0	8,000	0	0	0	0	8,000
CAT-ASSESS. SPEC.	0	0	0	0	0	0	0	0	0	0	0	0
CAT-GROUP LEADER	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**47,927**	**29,960**	**53,560**	**131,447**	**21,032**	**28,800**	**8,000**	**2,203**	**0**	**0**	**3,000**	**194,482**
												194,482

YEAR 5

	SUMMER SALARY	RELEASE TIME	ANNUAL SALARY	SUBTOTAL SALARIES	FRINGES	STUDENTS	TRAVEL	STUDENT FRINGES	EQUIPMENT	SUPPLIES	OTHER	TOTAL
IRELAND	15,300	17,210	0	32,510	5,202	0	0	0	0	0	500	38,212
CARMICHAEL	0	0	0	0	0	0	0	0	0	0	0	0
BANDARANAYAKE	0	0	0	0	0	0	0	0	0	0	0	0
ROSS	0	0	0	0	0	0	0	0	0	0	0	0
BOISSIERE	0	0	0	0	0	0	0	0	0	0	0	0
RATNAYAKA	0	0	0	0	0	0	0	0	0	0	0	0
BROOKOVER	6,070	13,650	0	19,720	3,155	0	0	0	0	0	500	23,375
MARTINAT	0	0	0	0	0	0	0	0	0	0	0	0
McKINNEY	0		0	0	0	0	0	0	0	0	0	0
COORDINATOR FOR BIOLOGY TUTORING	0	0	45,075	45,075	7,212	0	0	0	0	0	500	52,787
ASST. COOR.-TECH WRITER	0	0	0	0	0	0	0	0	0	0	0	0
STAFF SUPPORT	0	0	0	0	0	0	0	0	0	0	0	0
STUDENT TUTORS	0	0	0	0	0	18,000	0	1,377	0	0	500	19,877
STUDENT INTERNSHIPS	0	0	0	0	0	0	0	0	0	0	0	0
TRAVEL	0	0	0	0	0	0	8,000	0	0	0	0	8,000
CAT-ASSESS. SPEC.	0	0	0	0	0	0	0	0	0	0	0	0
CAT-GROUP LEADER	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**21,370**	**30,860**	**45,075**	**97,305**	**15,569**	**18,000**	**8,000**	**1,377**	**0**	**0**	**2,000**	**142,251**
												142,251

COMPOSITE

	SUMMER SALARY	RELEASE TIME	ANNUAL SALARY	SUBTOTAL SALARIES	FRINGES	STUDENTS	TRAVEL	STUDENT FRINGES	EQUIPMENT	SUPPLIES	OTHER	TOTAL
IRELAND	58,362	33,920	0	92,282	14,765	0	0	0	0	6,000	2,500	115,547
CARMICHAEL	32,035	39,430	0	71,465	11,434	0	0	0	10,000	2,000	2,000	96,899
BANDARANAYAKE	20,648	41,404	0	62,052	9,928	0	0	0	0	0	0	71,980
ROSS	20,678	18,160	0	38,838	6,214	0	0	0	0	2,000	1,000	48,052
BOISSIERE	26,605	41,414	0	68,019	10,883	0	0	0	4,525	2,000	2,000	87,427
RATNAYAKA	26,250	40,450	0	66,700	10,672	0	0	0	0	0	0	77,372
BROOKOVER	28,415	42,640	0	71,055	11,369	0	0	0	0	3,000	2,500	87,924
MARTINAT	22,550	50,730	0	73,280	11,725	0	0	0	0	0	0	85,005
McKINNEY	0	0	0	12,406	1,985	0	0	0	0	0	0	14,391
COORDINATOR FOR BIOLOGY TUTORING	31,110	0	177,415	208,525	33,364	0	0	0	0	0	2,000	243,889
ASST. COOR.-TECH WRITER	31,110	0	132,340	163,450	26,152	0	0	0	0	0	0	189,602
STAFF SUPPORT	20,000	0	0	20,000	3,200	0	0	0	0	0	0	23,200
STUDENT TUTORS	0	0	0	0	0	72,000	0	5,508	0	0	2,000	79,508
STUDENT INTERNSHIPS	0	0	0	0	0	39,600	0	3,029	0	0	0	42,629
TRAVEL	0	0	0	0	0	0	40,000	0	0	0	0	40,000
CAT-ASSESS. SPEC.(50%)	0	0	108,180	108,180	17,309	0	0	0	0	0	0	125,489
CAT-GROUP LEADER(25%)	0	0	50,750	50,750	8,120	0	0	0	0	0	0	58,870
TOTAL	**317,763**	**308,148**	**468,685**	**1,107,002**	**177,120**	**111,600**	**40,000**	**8,537**	**14,525**	**15,000**	**14,000**	**1,487,785**
												1,487,785

PKSFI BUDGET JUSTIFICATION

Personnel

Principal Investigator **$ 92,282**

The P.I. will be responsible for implementation of all proposed components and successful management of program resources, implementation and testing of revised exercises, developing new exercises, review of overall program impact, preparation of dissemination materials, organization and analysis of data as well as working with faculty and CAT members to assess needs for revision and modification of plans and preparation of progress reports and final reports. The P.I. will spend 1-2 months each summer throughout the duration of the project and 25% release time in years 4 and 5.

CO-P.I. **IN-KIND**

The Co-P.I. will assist the P.I. in the above mentioned tasks. She will also act as a liaison between the Biology department and the administration officials including the Dean of Freshmen Studies and the external advisory committee. The Co-P.I. will spend 1 month each summer throughout the duration of the project and 25% release time in years 4 and 5.

Faculty (10) **$835,790**

Existing and new faculty will be responsible for the revision and restructuring of Biology I and II, implementation and testing, review of new text, design and implement new exercises, evaluate data, and implement new modules for new text as described in appendix I. Faculty will spend 1-2 months each summer throughout the duration of the project and 12.5 to 25% release time.

Staff Support **$20,000**

Staff Support will be responsible for scheduling and meeting with Bioscience companies to develop internship programs. He will design, develop and implement the internship program as well as evaluate and make revisions as needed.

Dean of Freshmen Studies **IN-KIND**

The Dean of Freshmen Studies is responsible for establishing an Office of Academic Enhancement. He will provide assistance to Biology faculty advisors. He will spend 20% of his time throughout the duration of the project.

Assistant Coordinator for Advising **IN-KIND**

The ACA will be responsible for providing assistance to the Dean of Freshmen studies as well as the Biology faculty advisors, assist in the preparation of dissemination materials and disseminate strategies & materials. He will spend 35% of his time throughout the duration of the project.

Student Tutors **$ 72,000**

Tutors will be used to test new training modules and methods. Funds are budgeted for student tutors for 45-50 hours per week of tutoring for approximately 40 weeks per year.

Student Internship **$39,600**
Five student interns will be hired in year 1; five students in year 2; six students in year 3, six students in year 4; university will fund cost of interns.

Center for the Advancement of Teaching (2)
CAT -Assessment Specialist **$108,180**
The Assessment Specialist will devote 50% of his or her time leading a cadre of Biology faculty through the process of (1) reflecting on the learning process in Biology, (2) developing a philosophy of teaching, (3) investigating what it means to "think like a scientist" in Biology courses, (4) reviewing state-of –the-art assessment methods in science instruction, (5) revising targeted Biology labs to make them more experiential and demanding of higher-level critical thinking skills, (6) creating a plan for and instruments of evaluation and finally, (7) conducting the evaluation.

CAT - Course Portfolio Working Group Leader **$50,750**
The Group Leader will devote 25% of his time assisting the Specialist. He is a member of the faculty who has experience in the portfolio process.

Fringes **$185,657**
Calculated at 16% of salaries for faculty and 7.65 for students

Travel **$40,000**

Travel for external advisory group meetings	$10,000
Travel for dissemination conference	$15,000
Travel for faculty to travel to meetings and outside faculty to travel to Xavier to learn about model	$15,000

Equipment–Personal Response Units **$ 14,525**
Funds are budgeted to purchase two-way base receivers (4) at approximately $350 each and two-way remote units (375) at approximately $35 each.

Supplies **$ 15,000**
Text books, micro grade software, and other office supplies.

Other **$ 14,000**
Paper, copying, faxing, and misc. cost.

Indirect Cost **IN-KIND**

TOTAL **$1,487,785**

Equipment
Personal Response Units
1. Two-way base receiver RX - 4000
2. Two-way RF remote TX – 3000

Manufacturer
Hyper Interactive Teaching Technology (HITT)

Formal Letter Documenting matching commitments for PKSFI/Xavier Biothrust 21

Xavier University is fully committed to providing the cost share described in the Biothrust 21 narrative and budget (listed below) and to sustaining this project as PKSFI funding decreases.

Co-PI summer effort and released time- $181,485

Dean of Freshmen/head Office of Academic Enhancement – 35% of salary, $110,000, for five years, for a total of $204,000.

Assistant Coordinator for Biology student advising – 35% of coordinator's salary ($42,000 per year) for five years for a total of $73,000.

Center for Advancement of Teaching assessment specialist – 50% of ($108,180) salary for five years for a total of $270,000

Indirect costs - $1,055,405

All grants described in the proposal supporting equipment, core facilities and laboratories (approximately $6M) have already been awarded and are committed.

Ongoing federal grants to promote student retention and involvement in research (approximately $3M per year) have already been awarded.

Calvin Tregre, Sr. Vice President for Administration, Xavier University
Authorized Representative

Contract Work Plan

a. PKSFI/Xavier Project Goals and Objectives

The ultimate goal of PKSFI/Xavier Biothrust 21 is to enhance the quantity and quality of Louisiana's biosciences workforce by: increasing retention of Xavier University Biology majors by at least 30% and assuring that the freshman & sophomore courses and labs they take meet the recommended standards of NRC's Bio 2010 report. To achieve this goal Xavier faculty will: revise and expand the content of year one General Biology courses (I and II); revise existing and develop new laboratory exercises for General Biology II and the second year Microbiology course to make them more inquiry based and quantitative; provide more effective feedback mechanisms that will allow instructors to better gauge student understanding of course content both in and outside of the classroom; enhance tutoring, technical writing, mentoring and advising support systems; develop a program to provide internships in local biosciences companies; carry out ongoing formative and summative evaluation of all activities; and disseminate the strategies and materials developed in Biothrust 21 to other Xavier science departments and other universities regionally and nationally.

Schedule of Activities

Year 1 – Revise and test workbook-based modules and first half of instructors guide for General Biology I & II; design and test new lab exercises for General Biology II; revise and test existing microbiology lab exercises; develop a plan for technical writing workshops and other activities to assist students in enhancing their writing skills; launch Office of Academic Enhancement; hire Biology tutoring coordinator who develops and tests new instruments for selecting and evaluating tutors; with GNO Inc., develop and implement Biosciences Internship program; introduce and test use of electronic Personal Responders.

Year 2 – Based on evaluations, revise and implement revised workbook-based modules and lab exercises in all sections of General Biology I & II and add interdisciplinary content; complete and implement full instructors guide; develop remaining Microbiology lab exercises and test all exercises based on evaluations; revise use of Personal Responders based on feedback and implement in all sections of General Biology I & II; explore potential out-of-class Electronic Testing Assessment (ETA) systems; revise and implement student tutor selection and evaluation instruments; develop tutor training materials; hire additional tutors; test training materials and expand tutoring hours; implement writing workshops and system to track student-progress on written assignments; revise bioscience internship program based on feedback and programmatic materials developed for students.

Year 3 – Revise all materials and lab exercises based on evaluations; develop and implement faculty training workshop for use of Personal Responders; Begin testing of ETA system in one course; implement portfolio writing approach and integrate General Biology II lab reports into Blackboard and technical writing program; continue implementation of revised workbooks, labs and faculty guides.

Year 4 – Implement ETA system as appropriate; continue implementation of workbooks, lab exercises, faculty guide, and student training materials; evaluate and fine tune overall program; develop dissemination materials and begin dissemination activities.

Year 5 – Continue implementation and dissemination activities, carry out final formative and summative evaluation and write final report.

b. PKSFI/Xavier Deliverables

See Contract Section X.

c. PKSFI/Xavier Performance Measures

The program evaluation will provide a formative (process) and summative (outcome) evaluation of all program goals and related activities of the proposed PKSFI grant. The proposed program evaluation follows the organization of the program strategies designed to support the goals and objectives of the Biothrust 21. This evaluation will be conducted following the standards established by Joint Committee on Standards for Educational Evaluation. [8] Reports will be provided to the Program Director for each semester and on an annual basis

Formative Evaluation: Formative evaluation is typically conducted during the development or improvement of a program. The preliminary formative or process evaluation to develop this proposal was conducted by the Academic Vice President and A & S Dean's Offices and the Chair and key faculty members of the Biology Department who will be responsible for carrying out program strategies, as well as key personnel from Xavier's Office of Resource Development, and personnel assigned as evaluators of the program. All activities of the program will undergo continual process evaluation using student attendance, data from program and biology department activities and responses to program evaluation measurement instruments. In general the evaluation design is a pretest – intervention – posttest design. The pretest data are the baseline course grade point averages for first and second year Biology classes for the three post-Katrina semesters as shown in the trend data presented earlier. The intervention is the proposed grant, and the posttest data are the overall course grade point averages (GPAs) for first and second year Biology classes each year during the intervention and in summary (cumulative for all years) at the end of the PKSFI grant period. Formative evaluation will be an ongoing process through the entire grant period in order to adjust for unexpected implementation situations and unexpected outcomes. Future program components may be adjusted both positive and negative unanticipated outcomes. Whenever possible existing departmental and university data will be used, including demographic data about each student. Web-based data collection will be emphasized, and web-based data sets will be maintained.

Summative Evaluation: Summative evaluation will focus on evaluation of the specific program activities by measuring student outcomes related to the activities. Outcome measurement will be used to determine: (1) "Was the stated goal or objective met by the program activities?", (2) if met, "What is the extent to which the goal or objective was met?" and (3) "What is the overall impact of the goal or objective on the University?"

The summative evaluation will examine group data (overall course grades) for Biology classes each year and for the overall grant period to compare to the pretest data. Whenever possible assessments of individual grant components (i.e., tutoring center attendance, "clicker" participation, quizzes, exams etc.) will be correlated with overall course grades to analyze their specific effects on outcomes. By analyzing assessments of individual grant components learning outcomes related to specific materials and methods can be evaluated. In the correlational analysis bivariate correlations will be calculated, and for significant correlations, regression equations will be calculated. If feasible, a

c. PKSFI/Xavier Performance Measures (cont.)

multiple regression analysis will be conducted that examines the relative contribution of individual grant components to overall course grades. Additionally, outcomes for courses and course components may be examined for their relationship to overall Senior Comprehensive Exam scores and specific, related questions from the comprehensive exams. Whenever possible, outcomes may be correlated with GRE and MCAT scores. Student writing data will provide repeated measurement of writing ability to see if writing improves over time. In the summative evaluation group data will be used to assess learning outcomes; however, advisors may find it useful to analyze individual student data to assess individual student outcomes and to plan remediation.

d. PKSFI/Xavier Monitoring Plan

See Contract Section X.

e. PKSFI/Xavier Utility of the Final Product

In achieving the Biothrust 21 retention goals, the number of African American Biologists graduating each year and available to the New Orleans Biosciences industry in New Orleans and Louisiana will increase to approximately 350 per year. These students will be more analytical, more quantitatively oriented and better able to address the challenges of 21st Century biology. They also will be better technical writers and, because of the Biosciences internship program, more likely to take a position in New Orleans or Louisiana.

a. PKSFI/Xavier Project Goals and Objectives

The ultimate goal of PKSFI/Xavier Biothrust 21 is to enhance the quantity and quality of Louisiana's biosciences workforce by: increasing retention of Xavier University Biology majors by at least 30% and assuring that the freshman & sophomore courses and labs they take meet the recommended standards of NRC's Bio 2010 report. To achieve this goal Xavier faculty will: revise and expand the content of year one General Biology courses (I and II); revise existing and develop new laboratory exercises for General Biology II and the second year Microbiology course to make them more inquiry based and quantitative; provide more effective feedback mechanisms that will allow instructors to better gauge student understanding of course content both in and outside of the classroom; enhance tutoring, technical writing, mentoring and advising support systems; develop a program to provide internships in local biosciences companies; carry out ongoing formative and summative evaluation of all activities; and disseminate the strategies and materials developed in Biothrust 21 to other Xavier science departments and other universities regionally and nationally.

Schedule of Activities

Year 1 – Revise and test workbook-based modules and first half of instructors guide for General Biology I & II; design and test new lab exercises for General Biology II; revise and test existing microbiology lab exercises; develop a plan for technical writing workshops and other activities to assist students in enhancing their writing skills; launch Office of Academic Enhancement; hire Biology tutoring coordinator who develops and tests new instruments for selecting and evaluating tutors; with GNO Inc., develop and implement Biosciences Internship program; introduce and test use of electronic Personal Responders.

Year 2 – Based on evaluations, revise and implement revised workbook-based modules and lab exercises in all sections of General Biology I & II and add interdisciplinary content; complete and implement full instructors guide; develop remaining Microbiology lab exercises and test all exercises based on evaluations; revise use of Personal Responders based on feedback and implement in all sections of General Biology I & II; explore potential out-of-class Electronic Testing Assessment (ETA) systems; revise and implement student tutor selection and evaluation instruments; develop tutor training materials; hire additional tutors; test training materials and expand tutoring hours; implement writing workshops and system to track student-progress on written assignments; revise bioscience internship program based on feedback and programmatic materials developed for students.

Year 3 – Revise all materials and lab exercises based on evaluations; develop and implement faculty training workshop for use of Personal Responders; Begin testing of ETA system in one course; implement portfolio writing approach and integrate General Biology II lab reports into Blackboard and technical writing program; continue implementation of revised workbooks, labs and faculty guides.

Year 4 – Implement ETA system as appropriate; continue implementation of workbooks, lab exercises, faculty guide, and student training materials; evaluate and fine tune overall program; develop dissemination materials and begin dissemination activities.

Year 5 – Continue implementation and dissemination activities, carry out final formative and summative evaluation and write final report.

b. PKSFI/Xavier Deliverables

See Contract Section X.

c. PKSFI/Xavier Performance Measures

The program evaluation will provide a formative (process) and summative (outcome) evaluation of all program goals and related activities of the proposed PKSFI grant. The proposed program evaluation follows the organization of the program strategies designed to support the goals and objectives of the Biothrust 21. This evaluation will be conducted following the standards established by Joint Committee on Standards for Educational Evaluation. [8] Reports will be provided to the Program Director for each semester and on an annual basis

Formative Evaluation: Formative evaluation is typically conducted during the development or improvement of a program. The preliminary formative or process evaluation to develop this proposal was conducted by the Academic Vice President and A & S Dean's Offices and the Chair and key faculty members of the Biology Department who will be responsible for carrying out program strategies, as well as key personnel from Xavier's Office of Resource Development, and personnel assigned as evaluators of the program. All activities of the program will undergo continual process evaluation using student attendance, data from program and biology department activities and responses to program evaluation measurement instruments. In general the evaluation design is a pretest – intervention – posttest design. The pretest data are the baseline course grade point averages for first and second year Biology classes for the three post-Katrina semesters as shown in the trend data presented earlier. The intervention is the proposed grant, and the posttest data are the overall course grade point averages (GPAs) for first and second year Biology classes each year during the intervention and in summary (cumulative for all years) at the end of the PKSFI grant period. Formative evaluation will be an ongoing process through the entire grant period in order to adjust for unexpected implementation situations and unexpected outcomes. Future program components may be adjusted both positive and negative unanticipated outcomes. Whenever possible existing departmental and university data will be used, including demographic data about each student. Web-based data collection will be emphasized, and web-based data sets will be maintained.

Summative Evaluation: Summative evaluation will focus on evaluation of the specific program activities by measuring student outcomes related to the activities. Outcome measurement will be used to determine: (1) "Was the stated goal or objective met by the program activities?", (2) if met, "What is the extent to which the goal or objective was met?" and (3) "What is the overall impact of the goal or objective on the University?"

The summative evaluation will examine group data (overall course grades) for Biology classes each year and for the overall grant period to compare to the pretest data. Whenever possible assessments of individual grant components (i.e., tutoring center attendance, "clicker" participation, quizzes, exams etc.) will be correlated with overall course grades to analyze their specific effects on outcomes. By analyzing assessments of individual grant components learning outcomes related to specific materials and methods can be evaluated. In the correlational analysis bivariate correlations will be calculated, and for significant correlations, regression equations will be calculated. If feasible, a

c. PKSFI/Xavier Performance Measures (cont.)

multiple regression analysis will be conducted that examines the relative contribution of individual grant components to overall course grades. Additionally, outcomes for courses and course components may be examined for their relationship to overall Senior Comprehensive Exam scores and specific, related questions from the comprehensive exams. Whenever possible, outcomes may be correlated with GRE and MCAT scores. Student writing data will provide repeated measurement of writing ability to see if writing improves over time. In the summative evaluation group data will be used to assess learning outcomes; however, advisors may find it useful to analyze individual student data to assess individual student outcomes and to plan remediation.

Annual Report for Year 3 (ending 6/30/2010)

PKSFI /Xavier Biothrust 21: Rebounding from Katrina and Producing a Larger, Better Prepared, 21st Century Biosciences Workforce for Louisiana

Year 3 Report

Submitted, July 2010

I. Personnel and major responsibilities (PKSFI funded)

1) Shubha Kale Ireland (P. I.): Planning all departmental PKSFI activities, forming committees, preparing and presenting progress reports, developing research/analysis based assignments for the lecture and labs courses, organizing the Tutoring Center activities.
2) Mary Carmichael: Coordinating and leading all Gen. Bio I sub-projects.
3) Michelle Boissiere: Coordinating and leading all Gen. Bio II (Biol 1240) sub-projects.
4) Joseph Ross: Assisting in data analysis, determining co-relationship between Senior Comprehensive Exam (for Biology majors) and the retention of the knowledge learned in Gen. Bio I and II.
5) Calvin Porter: Coordinating Senior Comps and assisting in data analysis.
6) Harris McFerrin: Assisting in Gen. Bio I activities particularly with respect to addition of new technology.
7) Mack Crayton: Revising the Gen. Bio I labs and developing new handouts and question banks.
8) Kristi Brumfield: Assisting in Gen. Bio I lab revisions and with use of clickers.
9) Peter Barrett: Assisting in data analysis of Gen. Bio I exams and grades.
10) Kristal Huggins: Managing the Biology Tutoring Center.

Personnel ('in-kind' contribution for the PKSFI project)

11) Mary Carmichael: Coordinating all advising activities
12) Jaime Missimer: Assisting in student advising
13) Deidre Labat: Assisting in all activities of Gen. Bio I
14) Gene D'Amour: As the senior V. P. for Resource Development, facilitating the research, internship and training activities for students

II. Activities and Findings

i) Major Pedagogical Activities

As in previous years, departmental committees were set up for various PKSFI activities of Gen. Bio I and II lecture and labs and also for Tutoring Center activities. Members of these committees met once a week to discuss the ongoing projects, difficulties encountered if any, student input and further activities. In addition, as necessary, all PKSFI activities were presented for input during the official faculty meetings, held once a month. In addition, the P. I. and the individual committees held regular meetings to review the mid-term grades, student performance, input from tutors and related matters. Finally, the P. I. presented periodic progress reports to the internal advisory committee consisting of Sr. V. P. for Resource Development, Associate VPAA, Deans, College of Arts & Sciences and Dean of Freshmen studies.

Summary of the Pedagogical Activities

1) Made the necessary adjustments (additions/deletions) to the newly developed Instructors' Guide for Gen. Bio I.
2) Based on students' input, fine-tuned the Students' Summary Notes (developed in year one) and made the necessary alterations to make these even more useful and easy-to-understand.
3) Altered the students' 'Workbook' for Gen. Bio I including the 'on-line' homework questions to reflect the changes in content.
4) Reviewed and revised the Gen. Bio I test-banks developed in year one based on student performance and understanding of the material taught.
5) Fine tuned the Gen. Bio II modules and developed new questions for the test banks.
6) Started a major revision coordination project for Gen. Bio I labs.
7) Hired peer tutors to provide assistance to students enrolled in the courses.
8) Developed techniques to increase participation of Gen. Bio I and II students in the Tutoring Center.

ii) Findings, Data and Interpretations

Significant Improvement in Midterm Grades for Gen. Bio I (called Biol 1230 at XU)

Pre-PKSFI % Ds and Fs at midterm	Three years after the start of PKSFI Biothrust 21 % Ds and Fs at midterm
Average 68 %	Average 39.9 %

As seen by the above findings, prior to start of the PKSFI Biothrust 21 program, the %Ds and Fs (students not passing) at midterm was high, averaging around 65%. Just three years later, with the LA BOR funded PKSFI activities and with the support of the department and the University, we are very pleased to report a significant improvement with the % of Ds and Fs in Fall 2009 recorded as 48.5% while those in Spring 2010 as 31.3%. This is a decrease of 19.5% for the Fall 2009 'on sequence' semester and that of 36.7% for the Spring 2010 'off sequence' semester.

Significant Improvement in Midterm Grades for Gen. Bio II (called Biol 1240 at XU)

Pre-PKSFI % Ds and Fs at midterm	Three years after the start of PKSFI Biothrust 21 % Ds and Fs at midterm
Average 61 %	Average 34.5 %

As seen above, prior to the start of PKSFI Biothrust 21 program, for Gen. Bio II, the second course in the sequence, after Gen. Bio I, the %Ds and Fs (students not passing) at midterm was high, averaging around 61%. However, just three years later, with the LA BOR funded PKSFI activities and with the support of the department and the University, we report a significant improvement with the % of Ds and Fs in Fall 2009 recorded as 40.2% and those in Spring 2010 as 28.8%. This is a decrease of 19.8% for the Fall 2009 (off sequence) semester and that of 32.2% for the Spring 2010 (on sequence) semester. Once again, the department is very pleased to report this highly positive trend.

NOTE: The differences in the data between the Fall 2009 and the Spring 2010 semesters is neither unexpected nor new for the strictly coordinated courses like ours as we follow a defined population starting in the Fall 2009 semester, described below:

For Gen. Bio I, the Fall 2009 semester is the 'on sequence' semester for a cohort of Freshmen (defined here as population 'A') differing quite widely in terms of their exposure to Biology and their level of preparedness. Because this is their very first Biology course at Xavier and many do not yet possess a good understanding of how much studying needs to be done every day, they would be expected to show a relatively higher % of Ds and Fs at midterm. In our case (see above in the post-Katrina PKSFI data) this is demonstrated for population 'A' in form of 48.5% Ds and Fs at midterm in this semester.

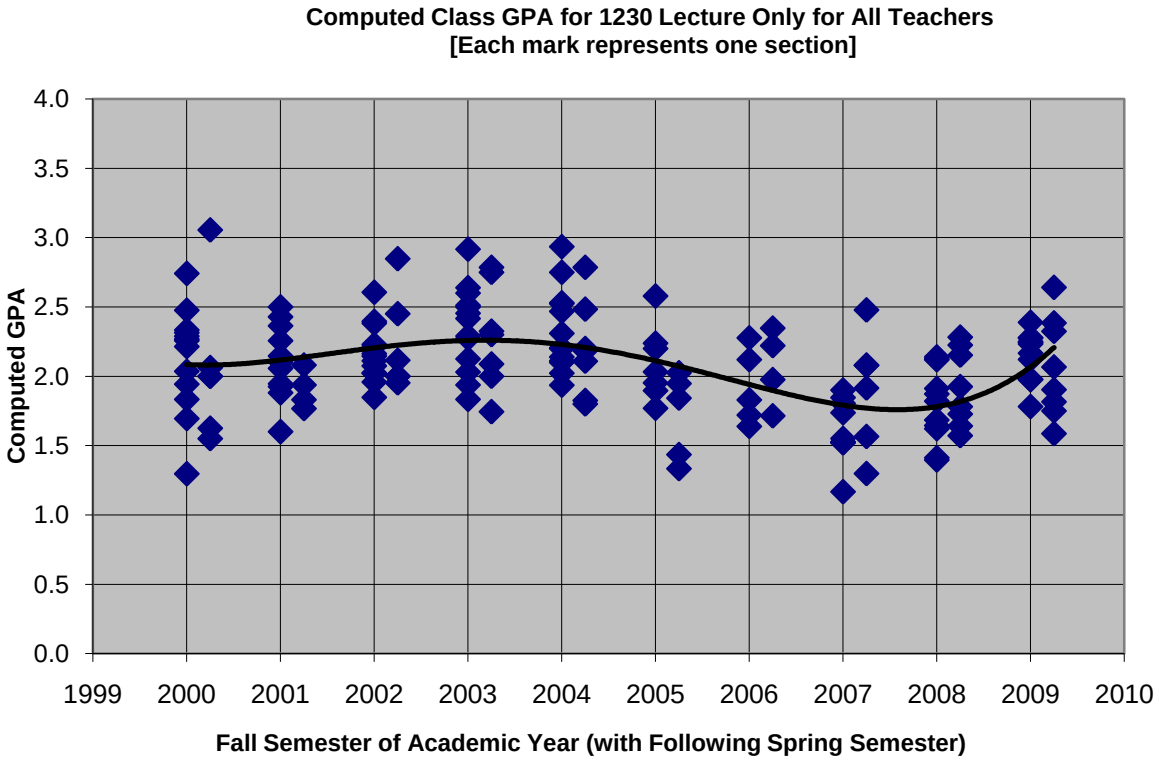
The Spring 2010 semester serves both as an 'on sequence' semester for Biol II and as an off-sequence semester for Biol I (see below for explanation). Thus, all students who are allowed to take Biol II are required to have completed the Biol I pre-requisite with a grade of 'C' or better. Because these students know exactly what is expected from such a course and are coming in after having successfully completed Biol I, they would be expected to get more easily acclimated and hence show a better performance at midterm. This is exactly what our data shows with only 28.8% of Ds and Fs at midterm for Biol II in this on-sequence spring semester.

The Spring 2010 however, also serves as the off-sequence semester for Gen. Bio I so the majority of students who took this course in the Spring 2010 were 'repeats' from population A. Because of their prior exposure to the course and due to their increased use of resources like tutoring and reviews, this group of students also would be expected to do better at mid-term in this semester compared to that in Fall 2009. Indeed, this pattern is reflected in the findings for Gen. Bio I for Spring 2010 (35.6%) compared to Fall 2009 (48.5%).

Final Exam Results and their analysis

Graph one:

Increase in Class GPA for Gen. Bio I (XU's Biol 1230)

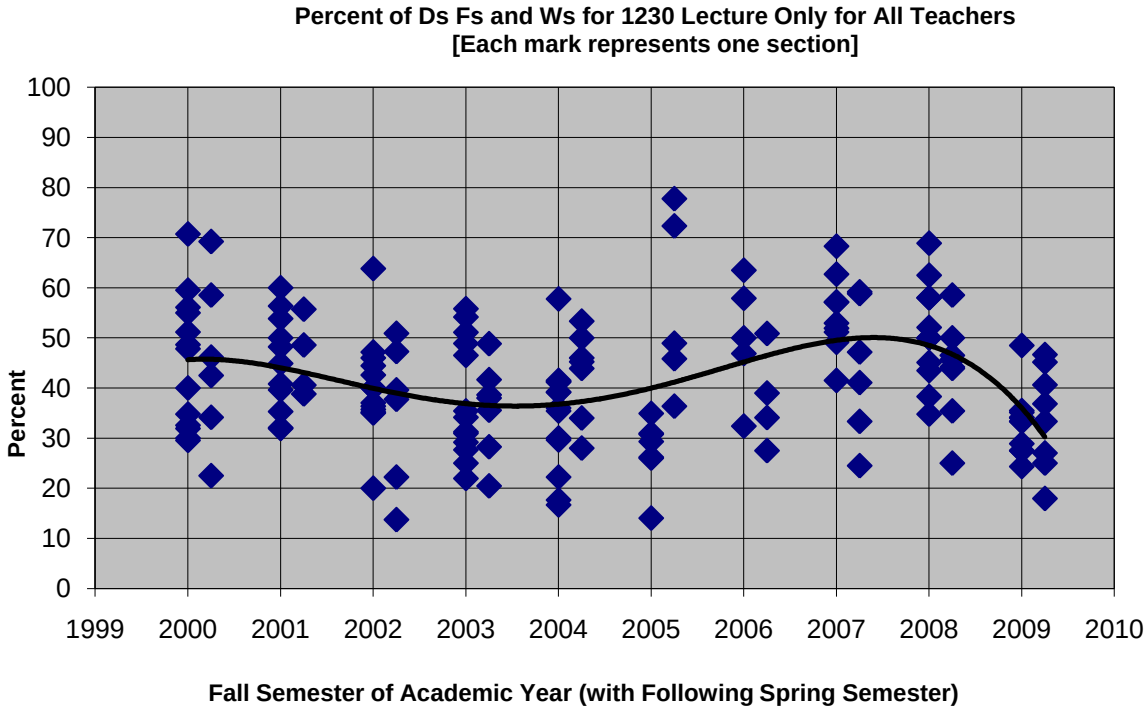


NOTE: The raw data over the past ten years (Fall 2000 through Spring 2010) was obtained through the registrar's office. The X axis represents the academic years. The Y axis represents the computed class GPA for each section (each mark corresponds to one section). Each section on average contained 50 students so this graph represents data for a total of 750-800 students for the two semesters of each academic year, Fall and Spring respectively.

The class GPA was calculated on a four point system by summing 4 points for each 'A', 3 points for each 'B', 2 points for each 'C', 1 point for each 'D' and no points for 'F' and 'FE' (FE = failure due to excessive absences; the term applicable only to 1000 level courses). This sum of points was then divided by the total number of students who completed the course to obtain the class GPA. The withdrawals ('W's) were omitted from this calculation. The overlaid trendline was computed using Excel's function for a fourth order polynomial best-fit trendline.

Graph two:

Decrease in final grades % Ds and Fs for Gen. Bio I (XU's Biol 1230)



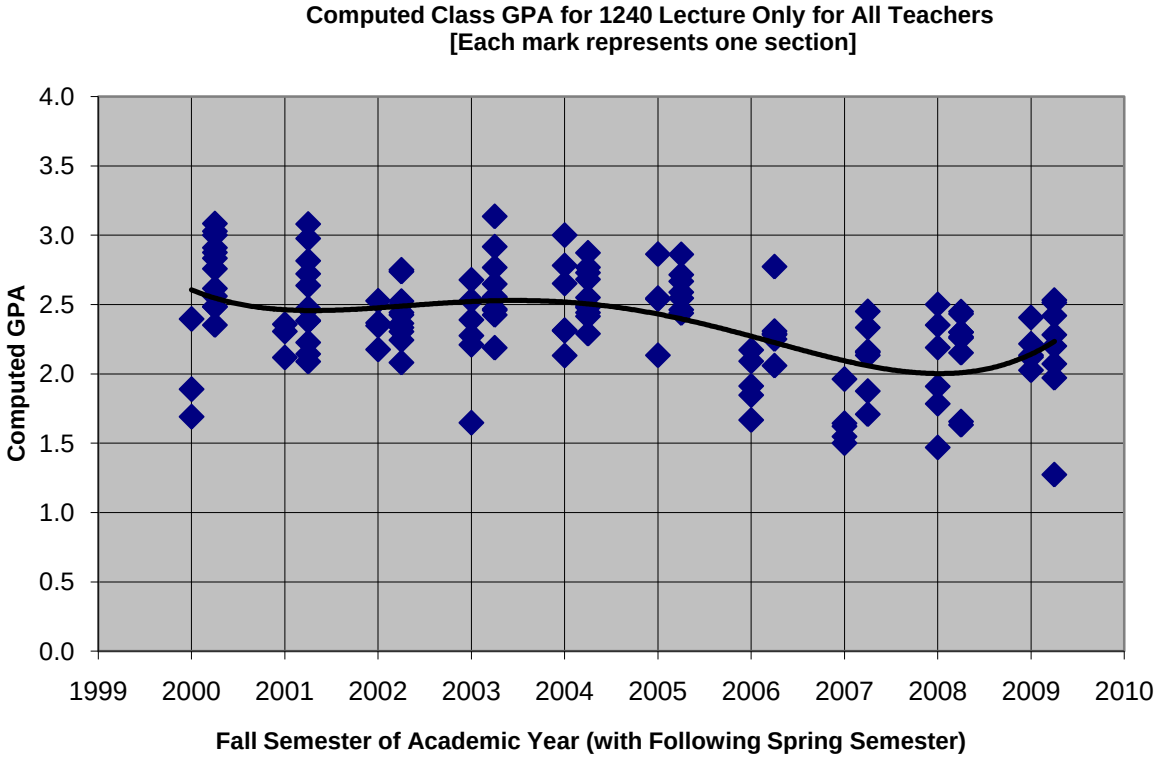
NOTE: The raw data over the past ten years (Fall 2000 through Spring 2010) was obtained through the registrar's office. The X axis represents the academic years. The Y axis represents the percent of Ds, Fs and Ws for each section where each mark corresponds to one section. Each section on average contained 50 students so this graph represents data for a total of 750-800 students for each of the two semesters of the academic year, Fall and Spring respectively. The percent of Ds, Fs and Ws was calculated by summing the total number of Ds, Fs and Ws respectively, dividing this number by total number of students and multiplying by 100. The overlaid trendline was computed using Excel's function for a fourth order polynomial best-fit trendline.

Interpretation of graphs one and two for Gen. Bio I: In the last year's report, we stated that the results through Spring 2009 clearly indicated a beginning of a positive trend. This positive trend has continued and is seen more clearly with the new data from Fall 2009 and

Spring 2010 with the performance of students in form of class GPA improving (average 2.10/4.00), while the percent of Ds, Fs and Ws decreasing (average in the 30s). These are very exciting results for such a large population (over 700 students) especially considering the pre-PKSFI numbers. These positive trends are attributed to all the Gen. Bio I-related activities as described in the grant and other factors including focused advising, early intervention for higher risk students and highly visible and advertised review sessions and tutoring center activities (described in following pages).

Graph three:

Increase in Class GPA for Gen. Bio II (XU's Biol 1240)



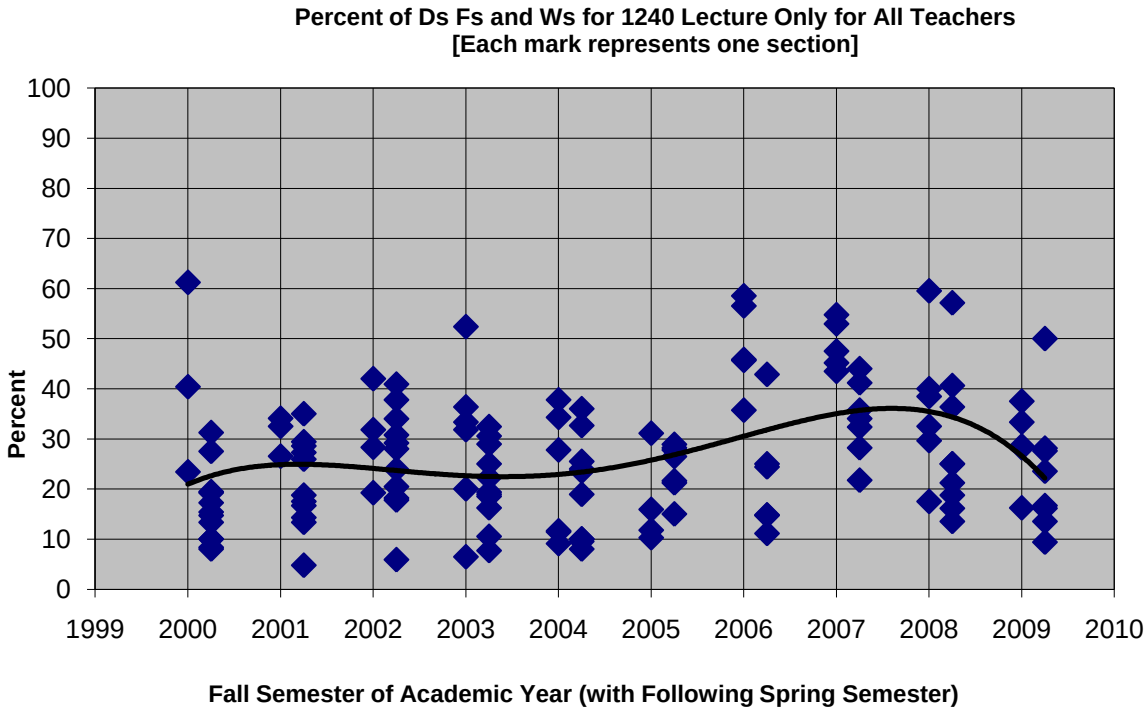
NOTE: The raw data over the past ten years (Fall 2000 through Spring 2010) was obtained through the registrar's office. The X axis represents the academic years. The Y axis represents the computed class GPA for each section (each mark corresponds to one section). Each section on average contained 50 students so this graph represents data for a total of 750-800 students for the two semesters of each academic year, Fall and Spring respectively.

The class GPA was calculated on a four point system by summing 4 points for each 'A', 3 points for each 'B', 2 points for each 'C', 1 point for each 'D' and no points for 'F' and 'FE' (FE = failure due to excessive absences; the term applicable only to 1000 level courses). This sum of points was then divided by the total number of students who

completed the course to obtain the class GPA. The withdrawals ('W's) were omitted from this calculation. The overlaid trendline was computed using Excel's function for a fourth order polynomial best-fit trendline.

Graph four:

Decrease in final grades % Ds and Fs for Gen. Bio II (XU's Biol 1240)



NOTE: The raw data over the past ten years (Fall 2000 through Spring 2010) was obtained through the registrar's office. The X axis represents the academic years. The Y axis represents the percent of Ds, Fs and Ws for each section where each mark corresponds to one section. Each section on average contained 50 students so this graph represents data for a total of 750-800 students for each of the two semesters of the academic year, Fall and Spring respectively. The percent of Ds, Fs and Ws was calculated by summing the total number of Ds, Fs and Ws respectively, dividing this number by total number of students and multiplying by 100. The overlaid trendline was computed using Excel's function for a fourth order polynomial best-fit trendline.

Interpretation of graphs three and four for Gen. Bio II: In the last year's report, we stated that the results through Spring 2009 clearly indicated a beginning of a positive trend. This positive trend has continued and is seen more clearly with the new data from Fall 2009 and Spring 2010 with the performance of students in form of class GPA improving (average 2.16/4.00), and the corresponding %Ds, Fs and Ws decreasing (average in the mid 20s). These are very exciting results for such a large population (over 700 students)

especially considering the pre-PKSFI numbers. These positive trends are attributed to all the Gen. Bio I-related activities as described in the grant and other factors including focused advising, early intervention for higher risk students and highly visible and advertised review sessions and tutoring center activities (described in following pages).

Tutoring Center Activities and results of the surveys

For both Gen. Bio I and II, all students who received 75% or less at mid-term were required to attend the tutoring center, in addition to meeting with their advisors, attending the review sessions and seeing their individual instructors.

New: Starting Fall 2009, the department has started directing even more efforts to intervene early even before midterm and encourage all students, but particularly the high risk group, to start using the tutoring center on a regular basis. After mid-term, as stated above, those receiving 75% or less were required to attend the center.

All student tutors were selected by a committee chaired by Dr. Ireland and fulfilled the following criteria: i) They had completed Gen. Bio I, II, Biodiversity and Microbiology (lecture and labs), ii) Received a grade of A (ideal) or a B, but nothing lower in each class, iii) Were responsible, punctual and enjoyed teaching.

The tutoring center hours were scheduled to accommodate all students' schedules and in addition to student tutors, faculty members also volunteered their time when possible to offer further assistance, especially during exam times.

Summary of the Results of the Student Surveys

Note: Over 350 students utilized the tutoring center each semester, although not every student participated in the survey and not every student answered every question. However, no student completed the survey twice so the each survey taken corresponds to one student.

Fall 2009 and Spring 2010 Tutoring Survey Results

	Fall 2009	Spring 2010	Average
Question 1 - **Have you used the Biology Tutoring Center this semester?**	Yes: 21% No: 79% **Total: 281**	Yes: 58% No: 42% **Total: 379**	Yes: 40% No: 60% **Total: 660**

Question 2 - **What course did you attend the tutoring center for?**	1230Lec: 56% 1230Lab: 8% 1230Lec&Lab: 34% 1240Lec: 0.42% 1240Lab: 0% 1240Lec&Lab: 0.42% **Total: 238**	1230Lec: 44% 1230Lab: 15% 1240Lec: 33% 1240Lab: 8% **Total: 321**	1230Lec: 59% 1230Lab: 20% 1240Lec: 17% 1240Lab: 4% **Total: 559**
Question 3*- **How often did you attend the tutoring center?**	Once: 32% A few times: 46% Before tests: 5% Regularly: 14% **Total: 234**	Once: 34% A few times: 47% Before tests: 7% Regularly: 12% **Total: 253**	Once: 33% A few times: 47% Before tests: 6% Regularly: 13% **Total: 487**
Question 4 - **Was it recommended that you go to the tutoring center because you had below a C at midterm?**	Yes: 58% No: 42% **Total: 276**	Yes: 36% No: 64% **Total: 346**	Yes: 47% No: 53% **Total: 622**
Question 5 - **Did you go more often for help with lecture or lab?**	Lab: 10% Lec: 77% Both: 13% **Total: 234**	Lab: 8% Lec: 82% Both: 10% **Total: 247**	Lab: 9% Lec: 80% Both: 11% **Total: 481**
Question 6 - **If you are in 1230 lab, did you utilize the special lab tutorials held weekly?**	Yes: 13% No: 64% N/A: 22% **Total: 267**	Yes: 7% No: 42% N/A: 51% **Total: 329**	Yes: 10% No: 53% N/A: 37 **Total: 596**
Question 7- **Do you feel that going to the tutoring center has helped you understand the material?**	Yes: 61% No: 15% N/A: 24% **Total: 268**	Yes: 50% No: 14% N/A: 36% **Total: 338**	Yes: 56% No: 14% N/A: 30% **Total: 606**
Question 8 - **Did your grade improve after going to the tutoring center?**	Yes: 47% No: 26% N/A: 27% **Total: 265**	Yes: 33% No: 25% N/A: 42% **Total: 336**	Yes: 40% No: 25% N/A: 35% **Total: 601**
Question 9 - **Were the tutors helpful?**	Never: 4% Sometimes: 36% Most times: 33% Always: 26% **Total: 231**	Never: 6% Sometimes: 39% Most times: 29% Always: 26% **Total: 255**	Never: 5% Sometimes: 38% Most times: 31% Always: 26% **Total: 486**

Question 10* - **Did you use the materials available to you in the tutoring center?**	Prac. Tests: 28% Modules: 30% Handouts: 22% Computer: 7% Bio books: 13% **Total: 341**	Prac. Tests: 22% Modules: 38% Handouts: 22% Computer: 10% Bio books: 8% **Total: 284**	Prac. Tests: 25% Modules: 34% Handouts: 22% Computer: 8% Bio books: 11% **Total: 625**
Question 11 - **Were the tutoring center hours compatible with your schedule?**	Yes: 85% No: 15% **Total: 238**	Yes: 79% No: 21% **Total: 219**	Yes: 82% No: 18% **Total: 457**
Question 12 - **Will you use the tutoring center next semester?**	Yes: 85% No: 5% N/A: 10% **Total:218**	Yes: 71% No: 10% N/A: 19% **Total: 249**	Yes: 78% No: 8% N/A: 14% **Total: 467**
Question 13 - **If there was an informal biology discussion group next semester, would you attend?**	Yes: 91% No: 9% **Total: 259**	Yes: 85% No: 15% **Total: 252**	Yes: 88% No: 12% **Total: 511**

Written responses ranged from 'more tutors, more practice tests and visual aids to help on test-taking strategies and more tutoring/help for the Gen. Bio I and II labs. Several students also commented that everything was fine the way it was.

Note: Based in part on this survey and in part on student-advisor meetings, approximately 70% of the students who were recommended to attend the tutoring center did attend it, although some used in regularly, others visited it only a few times.

Based on these results, the Biology department will attempt to increase the number of tutors, extend the hours of operation especially during midterms and final exams, supply additional charts, models, sample questions and reference texts and plan an informal biology discussion group session (to be held once a week or once every other week) to help students gain a better understanding of and how to apply the biological concepts taught in class.

Other related information

1) To extend and apply the success of Gen. Biol I (XU's Biol 1230), the PKSFI faculty members have recently started a new Gen. Biol I lab (XU's Biol 1230 lab) project to review that course, fine tune exercises, develop common Powerpoint presentations, develop new exercise(s) and develop a new question banks and practical questions.
2) The use of HITT clickers is also being fine tuned and defined with the goal of eliminating all paper quizzes in the near future.
3) As more data is gathered and analyzed, formative and summative program evaluations will continue through the remainder of summer 2010 to determine if the implemented changes should be further refined. Faculty members will be surveyed to obtain their observations and suggestions regarding the revised curriculum, as well as opinions concerning any additional adjustments which may be considered.

iii) Opportunities for Student Training and Workforce Development

Bench based research (on and off campus)

Approximately 65% of the tenure-track (or tenured) Biology faculty members were engaged in externally or internally funded research during the year two of the PKSFI project. Approximately 70% of these involved undergraduate students (on average 2 per faculty member) in his/her research project during the academic year and/or during the summer. Several of these students worked with a faculty member from XU on a project that had active collaborations with other institutions, federal, state or private and received PKSFI funding for their training. This activity exposed the student participants to various angles of research, helped them decide if they truly enjoyed working in a research environment and better prepared them for their future.

Tutoring Center activities

The Biology Tutoring Center (data described in detail above) allowed the upper-level students who were hired as tutors an excellent opportunity to obtain a foundation/training in being instructors. In addition, such meetings encouraged students to form informal groups and teach each other the more difficult topics of Biology.

iv) Problems Encountered

No major impediments or problems were encountered this year. Overall, everything is proceeding well and the Biology department remains very grateful to the LA BOR for this opportunity which has already resulted in highly encouraging results.

III. Contributions

i) Efforts made to provide significant improvements to undergraduate science education

The two Biology courses which are at the center of this proposal (Biol 1230 and Biol 1240) are not only core courses for all Biology majors (totaling over 800 students) but are also required courses for all Chemistry pre-med majors, Psychology pre-med majors and pre-Pharmacy students (for a combined total of over 300). Furthermore, these two courses are pre-requisites for all upper level Biology courses, many of which are also taken by non-Biology, pre-med majors. If the instructors are unable to cover some modules or the modules are not covered in the appropriate depth, students typically miss out on getting introduced to those (uncovered) topics. The students thus have difficulty later on when taking upper level Biology courses, since these assume (and require) that specific knowledge was acquired during the Biol 1230 and Biol 1240 (General Biology) sequence.

For reasons described above, implementation of every single activity outlined in the proposal and described in this report has a direct and a positive impact on undergraduate science education at Xavier.

ii) Building institutional capacity, ensuring project sustainability and/or scalability

Office of Academic Enhancement

The goals of the Freshman Year Experience (headed by Dean Kenneth Boutte) are to empower freshmen with the skills and support needed for college (Xavier) success, enhance their professional development, and understand their role and mission as Xavier students. Through this program, Xavier students are exposed to the mission of XU, the vision of St. Katharine Drexel, University policies and procedures, skills for academic success, academic support programs and other resources, means to achieve physical, mental, and spiritual well-being, skills and behaviors for professional success, fiscal responsibility, campus organizations and co-curricular activities and use of technology.

The Freshman Year Experience includes the New Student Orientation, the Freshman Seminar courses (FRSM 1000 and FRSM 1100), student monitoring and mentoring, a freshman book reading, and a common theme that can be used in first-year courses.

Advising

Academic advising has always been a significant component of all academic programs at Xavier. During the academic year 2009-2010, Dr. Mary Carmichael, Associate Chair, took on the responsibility as the Coordinator for Advising and Ms. Jaime Missimer was hired as the Assistant Coordinator for Advising. This addition of personnel has provided the much-needed assistance for student mentoring and is playing a significant role in accomplishing

the goals of the PKSFI Biothrust 21 proposal. As in previous years, in year three as well, each biology major was assigned a faculty member as an advisor. Biology faculty assisted their advisees regarding course selection during registration. In addition, students enrolled in General Biology and General Chemistry were required to 'self report' their grades on advisor cards and have these signed by their advisors weekly. This process promotes early identification and intervention in cases where students are experiencing difficulties and need assistance in obtaining appropriate academic support. Also, it allows students to get to know their advisors (and *vice versa*). In order to encourage the intended use of these advisor cards, students are rewarded with a bonus point each time they submit a signed card. While these points do not significantly alter their final grades, they do provide an incentive in the areas mentioned. In addition to the formal academic advising of students, faculty also volunteer to serve as advisors to a number of discipline-oriented clubs. These include a chapter of Beta Beta Beta, the national Biological Honor Society, the pre-dental club, the pre-vet club and the Biology club.

Based on the PKSFI-related data and our own internal departmental analysis, we have determined that students need to be monitored more closely for the courses they register for and making sure that there are more 'checks and balances' with respect to them (the students) completing their pre-requisites before signing up for the next course. These findings have also prompted the department to approach (through appropriate administrative channels) the Registrar's office and the IT department to ensure that the software program used for the on-line registration has all the necessary 'blocks' in place so that it will deter students from taking courses out-of-sequence.

University-funded Release Time Slots to Supplement the PKSFI funding

Since the 2007-2008 academic year, the university, through the VPAA's office, has devised a new scheme where each department is eligible to receive a total of 'X' number of release time slots (where X = total number of faculty in the department) per academic year, for pedagogical and lab-bench based research projects. This has been an excellent opportunity for several projects in the department. This university-funded initiative will continue to supplement the funding by the PKSFI Biothrust 21 program to accomplish the goals outlined in the grant.

IV. Project Revisions

None. All the goals and overall plans for year four remain unchanged.

Report prepared by Shubha Kale Ireland, P. I.

Annual Report for Year 2 (ending 6/30/2009)

PKSFI /Xavier Biothrust 21: Rebounding from Katrina and Producing a Larger, Better Prepared, 21st Century Biosciences Workforce for Louisiana

Year 2 Report

Submitted, May 26, 2009

I. Personnel (PKSFI funded)

1) Shubha Kale Ireland (P. I.): Planning all departmental PKSFI activities, forming committees, preparing and presenting progress reports, developing research/analysis based assignments for Microbiology labs, organizing the Tutoring Center activities.
2) Mary Carmichael: Coordinating and leading all Gen. Bio I sub-projects.
3) Michelle Boissiere: Coordinating and leading all Gen. Bio II (Biol 1240) sub-projects.
4) Joseph Ross: Assisting in data analysis, determining co-relationship between Senior Comprehensive Exam (for Biology majors) and the retention of the knowledge learned in Gen. Bio I and II.
5) Peter Barrett: Assisting in Gen. Bio I activities
6) Mack Crayton: Revising the Gen. Bio I labs and developing new handouts and question banks.
7) Syed Muniruzzaman: Developing a new exercise for Microbiology lab
8) Kristal Huggins: Managing the Biology Tutoring Center

I. Personnel ('in-kind' contribution for the PKSFI project)

9) Deidre Labat: Assisting in all activities of Gen. Bio I
10) Sister Grace Mary Flickinger: Coordinating all advising activities
11) Renada Fruga: Assisting in student advising
12) Ken Boutte: As the Dean, Office of Freshman Studies, providing incoming freshmen with the skills and support to succeed, to enhance their academic performance, to understand their role and mission as XU students and to ultimately improve the retention and graduation rates of students
13) Gene D'Amour: As the senior V. P. for Resource Development, assisting in locating research, internship and training programs for students

II. Activities and Findings

i) Major Pedagogical Activities (Gen. Bio I and II and Micro. Lab)

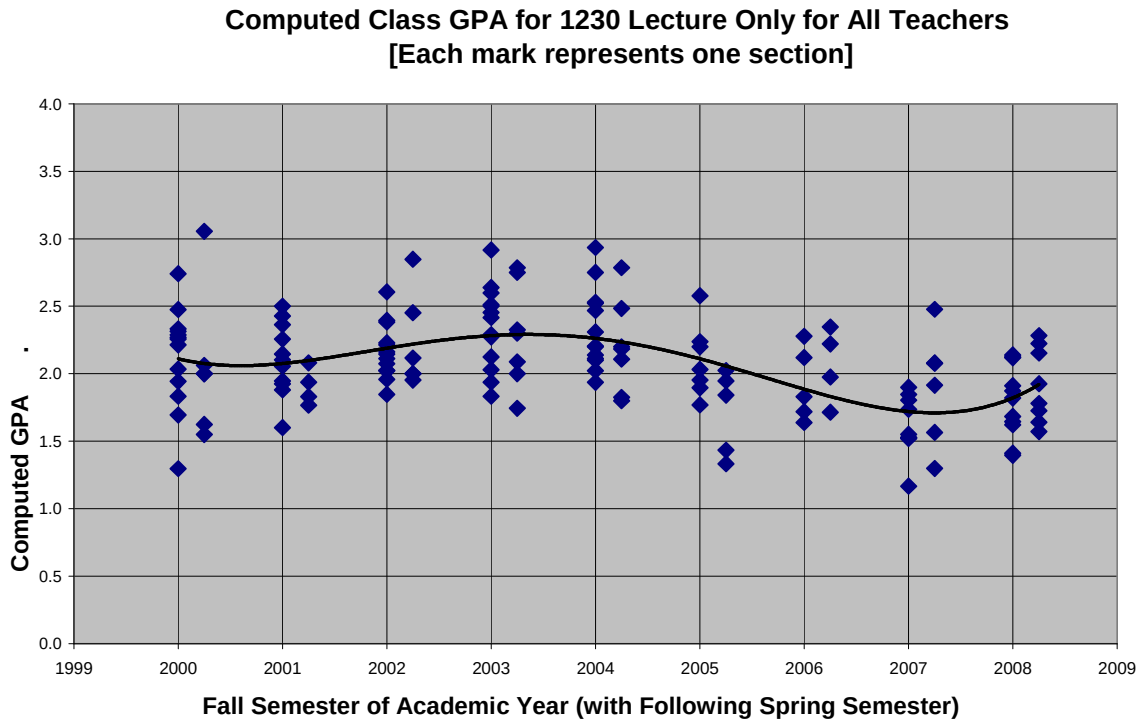
As in year one, separate committees were formed for various PKSFI activities (example for Gen. Bio I and II, Microbiology and Tutoring Center activities). Members of these committees met once a week to discuss the ongoing projects, difficulties encountered if any, student input and further activities. In addition, as necessary, all PKSFI activities were presented for input during the official faculty meetings, held once a month. In addition, the P. I. and the individual committees held regular meetings to review the mid-term grades, student performance, input from tutors and related matters. Finally, the P. I. presented periodic progress reports to the internal advisory committee consisting of Sr. V. P. for Resource Development, Associate VPAA, Deans, College of Arts & Sciences and Dean, Freshman studies.

Summary of the Pedagogical Activities

1) Completed all Gen. Bio I modules with respect to learning goals, definitions etc., and accordingly fine tuned all Gen. Bio I PowerPoint presentations (used by all instructors teaching this course).
2) Made the necessary adjustments (additions/deletions) to the newly developed Instructors' Guide for Gen. Bio I.
3) Reviewed the Gen. Bio I Students' Summary Notes (developed in year one) and made the necessary alterations to make these even more useful and easy-to-understand.
4) Altered the students' 'Workbook' for Gen. Bio I including the 'on-line' homework questions to reflect the changes in content.
5) Reviewed and revised the Gen. Bio I test-banks developed in year one based on student performance and understanding of the material taught.
6) Deployed clickers in all sections of Gen. Bio I (Spring 2009) to obtain baseline data on the feasibility of utilizing them on a regular basis.
7) Fine tuned the Gen. Bio II modules and developed new questions for the test banks.
8) Developed a new exercise for Microbiology lab (Analysis of Water Quality Using Membrane Filtration Technique) which was taught in one section in Spring 2009.
9) Developed new application and math-based assignments (worth 25 points) for Microbiology labs.
10) Hired peer tutors to provide assistance to students enrolled in the courses.

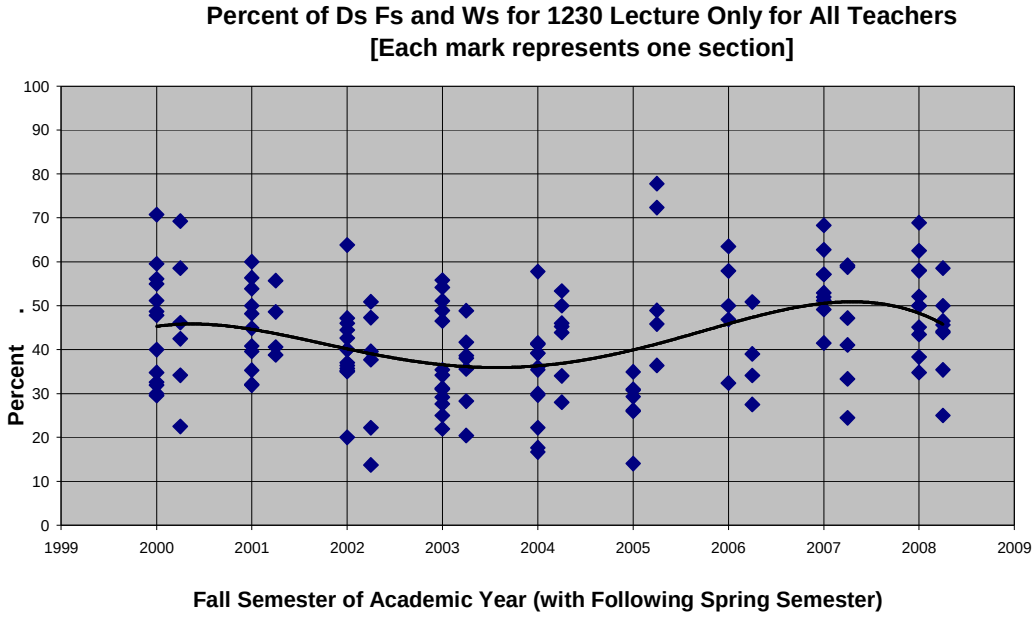
ii) Findings, Data and Interpretations

Results for Gen. Bio I (Graph one)



NOTE: The raw data over the past nine years (Fall 2000 through Spring 2009) was obtained through the registrar's office. The X axis represents the academic years. The Y axis represents the computed class GPA for each section (each mark corresponds to one section). Each section on average contained 50 students so this graph represents data for a total of 750-800 students for the two semesters, Fall 2008 and Spring 2009. The class GPA was calculated on a four point system by summing 4 points for each 'A', 3 points for each 'B', 2 points for each 'C', 1 point for each 'D' and no points for 'F' and 'FE' (FE = failure due to excessive absences; the term applicable only to 1000 level courses). This sum of points was then divided by the total number of students who completed the course to obtain the class GPA. The withdrawals ('W's) were omitted from this calculation. The overlaid trendline was computed using Excel's function for a fourth order polynomial best-fit trendline.

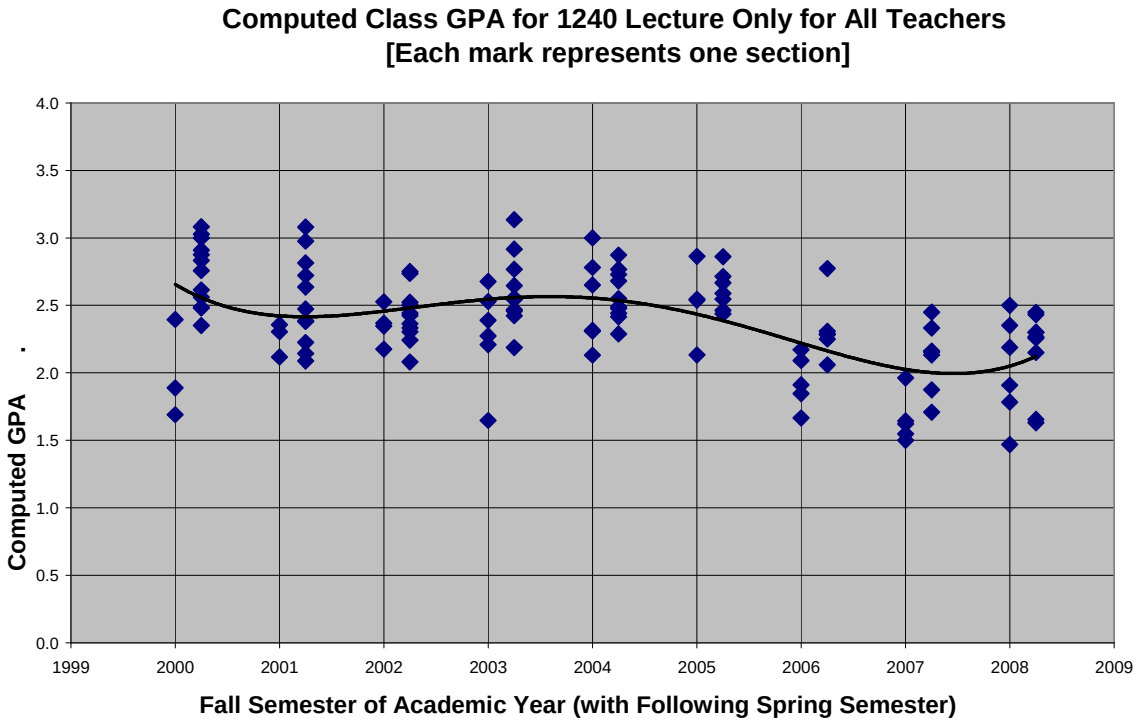
Results for Gen Bio. I (Graph two)



NOTE: The raw data over the past nine years (Fall 2000 through Spring 2009) was obtained through the registrar's office. The X axis represents the academic years. The Y axis represents the percent of Ds, Fs and Ws for each section where each mark corresponds to one section. Each section on average contained 50 students so this graph represents data for a total of 750-800 students for the two semesters, Fall 2008 and Spring 2009. The percent of Ds, Fs and Ws was calculated by summing the total number of Ds, Fs and Ws respectively, dividing this number by total number of students and multiplying by 100. The overlaid trendline was computed using Excel's function for a fourth order polynomial best-fit trendline.

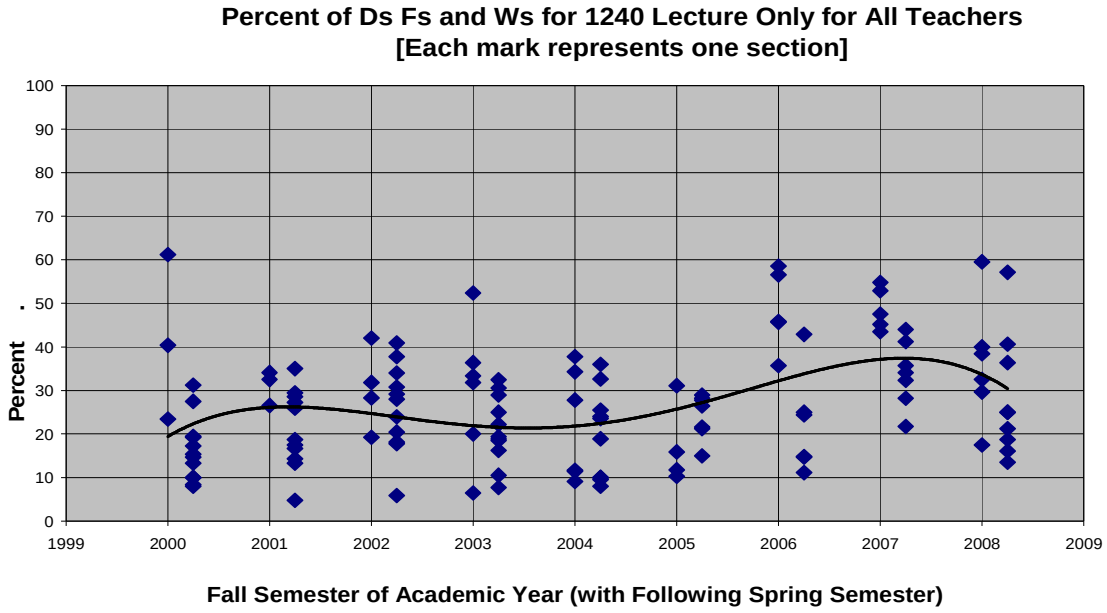
Interpretation of the two Gen. Bio I graphs: These results clearly indicate a beginning of a positive trend in that, over the past 2-3 semesters, after the start of this grant, performance of students in Gen. Bio I, our very first core Biology course is showing an upward swing (in form of class GPA), while the percent of Ds, Fs and Ws is going down. These are very exciting results for such a large population (over 700 students). While this is a little early to draw conclusions, these results become very significant considering that just a couple of years ago, more than 50% of the student population was receiving a grade of D or F at midterm in this course! These positive trends are attributed to all the Gen. Bio I-related activities as described in the grant and other factors including focused advising and highly visible and advertised review sessions, tutoring center activities and use of clickers (described in following pages).

Results for Gen. Bio II (Graph one)



NOTE: The raw data over the past nine years (Fall 2000 through Spring 2009) was obtained through the registrar's office. The X axis represents the academic years. The Y axis represents the computed class GPA for each section, where each mark corresponds to one section. Each section on average contained 40 students so this graph represents data for a total of 450-500 students for the two semesters, Fall 2008 and Spring 2009. The class GPA was calculated on a four point system by summing 4 points for each 'A', 3 points for each 'B', 2 points for each 'C', 1 point for each 'D' and no points for 'F' and 'FE' (FE = failure due to excessive absences; the term applicable only to 1000 level courses). This sum of points was then divided by the total number of students who completed the course to obtain the class GPA. The withdrawals ('W's) were omitted from this calculation. The overlaid trendline was computed using Excel's function for a fourth order polynomial best-fit trendline.

Results for Gen. Bio II (Graph two)



NOTE: The raw data over the past nine years (Fall 2000 through Spring 2009) was obtained through the registrar's office. The X axis represents the academic years. The Y axis represents the percent of Ds, Fs and Ws for each section where each mark corresponds to one section. Each section on average contained 40 students so this graph represents data for a total of 450-500 students for the two semesters, Fall 2008 and Spring 2009. The percent of Ds, Fs and Ws was calculated by summing the total number of Ds, Fs and Ws respectively, dividing this number by total number of students and multiplying by 100. The overlaid trendline was computed using Excel's function for a fourth order polynomial best-fit trendline.

Interpretation of the Gen. Bio II graphs: These results shown in the two graphs clearly indicate a beginning of a positive trend in that, since the past 2-3 semesters, after the start of this grant, overall performance of the students in Gen. Bio II, our second core Biology course (which has a pre-requisite of Gen. Bio I), is showing an upward swing (in form of class GPA), while the percent of Ds, Fs and Ws is going down. These are very exciting results, especially for such a large population (450-500 students). While this is a little early to draw conclusions, these results become very significant considering that just a couple of years ago, more than 50% of the student population was receiving a grade of D or F at midterm in this course! These positive trends are attributed to all the Gen. Bio II-related activities as described in the grant and focused advising and highly visible and advertised review sessions and tutoring center activities.

Additional Data on Gen. Bio I and II

In addition to the clear positive trends in student performance for both Gen. Bio I and II, mid-term performance also showed improvement with 8 – 12% more students receiving a passing grade of 'C' or better, compared to the numbers from the previous year.

Tutoring Center Activities and results of the surveys

For both Gen. Bio I and II, all students who received 75% or less at mid-term, were required to attend the tutoring center, in addition to meeting with their advisors, attending the review sessions and seeing their individual instructors.

The student tutors were selected by a committee chaired by the P. I., and fulfilled the following criteria: i) They had completed Gen. Bio I, II, Biodiversity and Microbiology (lecture and labs), ii) Received a grade of A (ideal) or a B, but nothing lower in each class, iii) Were responsible, punctual and enjoyed teaching.

The tutoring center hours were scheduled to accommodate all students' schedules and in addition to student tutors, faculty members also volunteered their time when possible to offer further assistance, especially during exam times.

Summary of the Results of the Student Surveys

Note: Over 350 students utilized the tutoring center, although not every student participated in the survey. However, no student completed the survey twice so the each survey taken corresponds to one student.

Question 1: Have you utilized the Biology Tutoring Center this semester?
- Yes: 70%
- No: 30%
- Total responses: 325

Question 2: What course did you attend the tutoring center for? Circle all that apply.
- 1230 lecture: 66%
- 1230 lab: 33%
- 1240 lecture: 0.6%
- 1240 lab: 0.3%
- Total responses: 310

Question 3: How often did you attend the tutoring center? Pick the choice that best describes how often.
- Once: 27%
- A few times: 57%
- Only before tests: 4%
- Regularly: 11%
- Total responses: 235

Question 4: Was it recommended that you utilize the center because of your grades?

Yes: 51%
No: 49%
Total responses: 307

Question 5: Did you go to the tutoring center to get help for lecture or lab or both?

Lab: 25%
Lecture: 58%
Both equally: 17%
Total responses: 235

Question 6: If you are in Biol 1230 (Gen. Bio I), did you utilize the special lab tutorials held weekly?

Yes: 16%
No: 59%
Not applicable: 25%
Total responses: 335

Question 7: Do you feel that going to the tutoring center has helped you understand the material?

Yes: 57%
No: 16%
Not applicable: 27%
Total responses: 295

Question 8: Did your grade improve by going to the tutoring center?

Yes: 37%
No: 28%
Not applicable: 35%
Total responses: 288

Question 9: Were the tutors helpful?

Never: 3%
Sometimes: 36%
Most of the time: 33%
Always: 28%
Total responses: 230

Question 10: Did you use the materials available to you in the tutoring center?

Circle all that apply.
Practice tests: 21%
Modules: 33%
Handouts: 24%
Computer: 9%
Extra biology books: 12%
Total responses: 410

Question 11: Were the tutoring center hours compatible with your schedule?

Yes: 77%
No: 23%
Total responses: 272

Question 12: Will you use the tutoring center next semester?

Yes: 88%
No: 6%
Not applicable: 6%
Total responses: 289

Question 13: If there was an informal biology discussion group held next semester to help you understand the concept of biology, would you attend?

Yes: 92%
No: 8%
Total responses: 286

Question 14: What other services would you like to see in the tutoring center?

Written responses ranged from 'more hours and tutors, more practice tests and visual aids to help on test-taking strategies, requests for actual professors tutoring (in addition to student-tutors) and more tutoring/help for the Gen. Bio I and II labs. Several students also commented that everything was fine the way it was.

Note: Based in part on this survey and in part on student-advisor meetings, approximately 75% of the students who were recommended to attend the tutoring center did attend it, although some used in regularly, others visited it only a few times.

Based on these results, the Biology department will attempt the following with respect to the tutoring center:

-Extend the hours of operation from M-R 8 am to 7 pm, F 8 am to 3 pm from last semester's hours of M-R 8 am to 5 pm, F 8 am to 3 pm.

- Increase the number of tutors employed based on extended hours of operation, scheduling constraints and high traffic times.

- Supply visual aids in the form of additional videos and posters/charts based on concepts taught in lecture and lab.

- Offer an informal biology discussion group to be held once a week or once every other week to help students gain a better understanding of and how to apply the biological concepts taught in class.

Activities for Microbiology Lab and preliminary results

1) Based on last year's success of the item analysis scores of application-based questions, each Micro lab instructor has undertaken development of such questions for his/her own section. These questions will be incorporated in the quizzes and exams in the coming academic year.

2) A new exercise called 'The Membrane Filtration Test' to test the quality of water samples was developed and implemented in one section of the Spring 2009 semester. Students in this section did both the traditional 'MPN' (Most probable number) and the newly developed 'Membrane Filtration' test to determine if their water samples were potable (of drinkable quality) and if they contained 'coliforms' (indicator organisms) such as *Escherichia coli*, which would indicate sewage contamination. Based on student input, both exercises contained straightforward data recording and yielded similar results. The Microbiology committee will meet to decide whether to include the new exercise or continue with the previous one and develop another new exercise to cover an area of Microbiology (example more biochemical tests to identify organisms) that can use more coverage in the course.
3) Preliminary results of the analysis of the newly developed 'Assignments' (worth 25 points) reveal that over 50% of the students had difficulty with questions where the answers were not easily found in textbooks, lab manuals or the world wide web. Some had writing skills that need improvement. This summer, the committee will analyze the questions and responses from various sections in more detail and meet to improve student performance in this portion of the course. This will be an important and essential task as all students, whether they pursue graduate school, medical school, other professional programs in Biology or join the work force, will be expected to apply the knowledge and think independently.

Results of the 'Feasibility of Clickers' study

During the Fall 2008 semester, personal response devices (clickers) were introduced in some, but not all sections. Due to the evacuation of the campus during Hurricane Gustav and the subsequent need to "catch up", there was not enough time to deploy the clickers uniformly, across all sections. However, this was accomplished during the Spring 2009 semester, where a clicker was assigned to every student in each section and responses were collected over the second half of the semester. Students earned up to 2.4% of their overall grade in the class based on their % of correct responses. Based on their input, students definitely enjoyed using the clickers and from a teaching point of view, this feasibility study showed that clickers could indeed be very helpful as an instructional tool on several levels, including allowing more time to test various concepts and retaining student interest and attention. Clickers will be a part of Gen. Bio I for the foreseeable future.

Other related information

As more data is gathered and analyzed, formative and summative program evaluations will continue through Summer 2009 to determine if the implemented changes should be further refined. Faculty members will be surveyed to obtain their observations and suggestions regarding the revised curriculum, as well as opinions concerning any additional adjustments which may be considered. Analysis of student outcomes will also include assessment of individual grant components such as Tutoring Center usage and correlation of student performance with specific modules.

iii) Opportunities for Student Training and Workforce Development

Lab-bench based research

A total of 60% of the tenure-track (or tenured) Biology faculty members were engaged in externally or internally funded research during the year two of the PKSFI project. Over 80% of these involved undergraduate students (on average 2-3 per faculty member) in his/her research project during the academic year and/or during the summer. This activity exposed the student participants to various angles of research, helped them decide if they truly enjoyed working in a research environment and better prepared them for their future.

Tutoring Center activities

The Biology Tutoring Center (data described in detail above) allowed the upper-level students who were hired as tutors an excellent opportunity to obtain a foundation/training in being instructors. In addition, such meetings encouraged students to form informal groups and teach each other the more difficult topics of Biology.

Plans for off-campus student-research training

As outlined in the proposal, research has been conducted to identify institutions, businesses and research programs to establish student research internships to obtain more formal training in the areas of biomedical, biotechnological or application-based research projects. These have been implemented since Spring of 2009 and will continue in year three.

iv) Problems Encountered

No major impediments or problems were encountered this year. The two sub-projects of the grant (clickers and the internships for students) are 'catching up' due to the slight delay in getting launched in year one (please refer to the year one report for details) as well as due to unexpected occurrences like the evacuation due to Hurricane Gustav. However overall, everything is proceeding well and the Biology department is very grateful to the LA BOR for this opportunity which has already resulted in highly encouraging results.

III. Contributions

i) Efforts made to provide significant improvements to undergraduate science education

The two Biology courses which are at the center of this proposal (Biol 1230 and Biol 1240) are not only core courses for all Biology majors (totaling over 800 students) but are also required courses for all Chemistry pre-med majors, Psychology pre-med majors and pre-Pharmacy students (for a combined total of over 300). Furthermore, these two courses are pre-requisites for all upper level Biology courses, many of which are also taken by non-Biology, pre-med majors. If the instructors are unable to cover some modules or the

modules are not covered in the appropriate depth, students typically miss out on getting introduced to those (uncovered) topics. The students thus have difficulty later on when taking upper level Biology courses, since these assume (and require) that specific knowledge was acquired during the Biol 1230 and Biol 1240 (General Biology) sequence.

For reasons described above, implementation of every single activity outlined in the proposal and described in this report has a direct and a positive impact on undergraduate science education at Xavier.

ii) Building institutional capacity, ensuring project sustainability and/or scalability

Office of Academic Enhancement

The goals of the Freshman Year Experience (headed by Dean Kenneth Boutte) are to empower freshmen with the skills and support needed for college (Xavier) success, enhance their professional development, and understand their role and mission as Xavier students. Through this program, Xavier students are exposed to the mission of XU, the vision of St. Katharine Drexel, University policies and procedures, skills for academic success, academic support programs and other resources, means to achieve physical, mental, and spiritual well-being, skills and behaviors for professional success, fiscal responsibility, campus organizations and co-curricular activities and use of technology.

The Freshman Year Experience includes the New Student Orientation, the Freshman Seminar courses (FRSM 1000 and FRSM 1100), student monitoring and mentoring, a freshman book reading, and a common theme that can be used in first-year courses.

Advising

Academic advising has always been a significant component of all academic programs at Xavier. During the academic year 2008-2009, Sister Grace Mary, SBS and Professor of Biology, continued to serve as the Coordinator for Advising. Since the summer of 2007, Ms. Renada Fruga, an XU graduate, has been serving as the Assistant Coordinator for Advising. This addition of personnel has provided much-needed assistance for student mentoring and is playing a significant role in accomplishing the goals of the PKSFI Biothrust 21 proposal. As in previous years, and in year two as well, each biology major was assigned a faculty member as an advisor. Biology faculty assisted their advisees regarding course selection during registration. In addition, students enrolled in General Biology and General Chemistry were required to 'self report' their grades on advisor cards and have these signed by their advisors weekly. This process promotes early identification and intervention in cases where students are experiencing difficulties and need assistance in obtaining appropriate academic support. Also, it allows students to get to know their advisors (and *vice versa*). In order to encourage the intended use of these advisor cards, students are rewarded with a bonus point each time they submit a signed card. While these points do not significantly alter their final grades, they do provide an incentive in the areas

mentioned. In addition to the formal academic advising of students, faculty also volunteer to serve as advisors to a number of discipline-oriented clubs. These include a chapter of Beta Beta Beta, the national Biological Honor Society, the pre-dental club, the pre-vet club and the Biology club.

In year two, based on the PKSFI-related data and our own internal departmental analysis, we have determined that students need to be monitored more closely for the courses they register for and making sure that there are more 'checks and balances' with respect to them (the students) completing their pre-requisites before signing up for the next course. These findings have also prompted the department to approach (through appropriate administrative channels) the Registrar's office and the IT department to ensure that the software program used for the on-line registration has all the necessary 'blocks' in place so that it will deter students from taking courses out-of-sequence.

University-funded Release Time Slots to Supplement the PKSFI funding

Since the 2007-2008 academic year, the university (through the VPAA's office) has devised a new scheme where each department would receive a total of 'X' number of release time slots (where X = total number of faculty in the department) per academic year, for pedagogical and lab-bench based research projects. This has been an excellent opportunity for several projects in the department. This university-funded initiative continues to supplement the funding by the PKSFI Biothrust 21 program to accomplish the goals outlined in the grant.

IV. Project Revisions

None. All the goals and overall plans for year three remain unchanged.

Report prepared by Shubha Kale Ireland, P. I.

PKSFI /Xavier Biothrust 21: Rebounding from Katrina and Producing a Larger, Better Prepared 21st Century, Biosciences Workforce for Louisiana

Year 1 Report

Submitted, June 26, 2008

I. Personnel (PKSFI funded)

1) Mary Carmichael: Revising and restructuring General Bio I (Biol 1230), conducting research on and ordering electronic testing assessment systems
2) Michelle Boissiere: Revising and restructuring General Bio II (Biol 1240)
3) Joseph Ross: Reviewing and revising the Xavier Microbiology Lab manual
4) Shubha Kale Ireland (P.I.): Organizing all departmental PKSFI activities, assisting in reviewing the Xavier Microbiology Lab manual, obtaining base-line data for two sections of Micro lab on student-response analysis for 'application' based versus more direct questions
5) Cecile Brookover: Assessment of grade distributions and analysis of data
6) Hema Bandaranayake: Assisting in the revision of General Bio I, coordinating the tutoring center activities
7) Harish Ratnayaka: Assisting in the revision of General Bio II
8) Peter Martinat: Assisting in the revision of General Bio II

I. Personnel ('in-kind' contribution for the PKSFI project)

9) Deidre Labat: Assisting in the revision of General Bio I
10) Gene D'Amour: Developing internship program for students
11) Sister Grace Mary Flickinger: Coordinating all advising activities
12) Renada Fruga: Assisting in student advising
13) Ken Boutte: Establishing the Office of Freshman Studies to provide incoming freshmen with the skills and support to succeed, to enhance their academic performance, to understand their role and mission as XU students and to ultimately improve the retention and graduation rates of students.

II. Activities and Findings

i) Major Pedagogical Activities (Biol I, Biol II and Micro. Lab)

Background and approaches for the activities

In late May 2007, the faculty involved in the PKSFI project began holding regular meetings to analyze the General Biology Lecture courses I and II (1230 and 1240). During these meetings faculty reflected on outcomes from recent years and discussed the changing face of science education. A consensus opinion on the best topic sequence for the two semester course was developed. Once the tentative sequence was delineated, decisions concerning depth of coverage were made for each module. The deciding factors in determining the appropriate depth were:

a. How much coverage of the material is necessary to succeed in the other required courses in our curriculum?
b. How applicable are the concepts in the modules to current workforce trends?

Once these overarching goals were determined, the faculty separated into groups based on individual specialty areas and in which courses they routinely teach. For Microbiology lab, the 'Microbiology committee' consisting of all the instructors who are involved in teaching this course took a similar approach to review the lab manual, revise and/or update relevant information, develop new application based questions and discuss potential new exercises. Once the work assignments were made for each of these courses, the work commenced in mid June, and continued into the academic year.

Summary of the Pedagogical Activities

1) Review and start revision of the existing General Biology 1230 and 1240 modules.
2) Develop the Instructors' Guide for these courses. Lecture Notes Summaries were not a part of the modules prior to Summer 2007. Therefore, each was composed originally during the grant period. The purposes of these instructors' guides are:
    a. To highlight and briefly explain the most important concepts in the module.
    b. To provide a clear, concise and uniform summation of key concepts.
    c. To allow instructors to increase the pace of classroom presentation when time is limited.
    Note: Time limitations have played a significant and deleterious role in the General Biology course for more than ten years. Specifically, during the decade preceding the grant period, 24 modules were listed as components of the two semester course but only 16 (67%) were actually covered.
3) Develop Students' Summary Notes on individual modules for these courses. These too were not a part of the modules prior to Summer 2007 and their main purpose was to facilitate student learning.
4) Ensure proper connection and coordination between learning goals, instructors' guide and students' notes for each module.

5) Start development and/or revision of modules that ideally should have been taught in these courses but for various reasons had not been able to be covered.
6) Include new/additional modules (from # 5 above) in these courses.
7) Develop new questions on the revised existing modules and new modules; create new test-banks for the coordinators. Supplement the existing question banks with new questions for the common exams.
   Note: The inclusion of lecture content that had not been taught in several years necessitated this task. A thorough review and revision of the question banks will be performed in the coming year.
8) Review and start revision of the existing Microbiology lab manual; analyze each exercise.
9) Develop new application and math-based questions for relevant existing Microbiology exercises for inclusion on the Spring 2008 final exam.
10) Research and start developing new Microbiology lab exercise(s) which have one or more components of the Biol 2010 initiative (more quantitative, more analytical and/or more research-based exercises).
11) Hire peer tutors to provide assistance to students enrolled in the courses.

ii) Findings and Data

During the progress report period, 100% of the initial revision activities for Biol I (1230) and Biol II (1240) and for the Microbiology labs (2010L) were accomplished. As explained in the proposal, these activities will be continued in year two. Other specific accomplishments included completing 50% of the tasks related to the Enhanced Feedback grant component related to electronic clickers, 100% of the tasks for the Tutoring and Advising grant components, and approximately 50% of the Bioscience Industry component.

Biol I and Biol II

The revised topic/module sequence resulted in a total of twenty-two modules for the two course sequence of Biol 1230 and Biol 1240 (24 modules were consolidated into 22 modules). During the 2007-2008 academic year, all 22 modules (or 100% of the planned sequence of modules) were successfully covered.

The new modules for BIOL 1230 and 1240 were first used in the classroom during the Fall 2007 semester and again used during the Spring 2008 semester. Whenever a major change is made in the content of a class, the first times that the changes are taught do not carry the full impact on student outcomes that later semesters will carry. Analysis of the first semesters of implementation is very valuable since the analysis will provide the information needed for refinement of the changes. This type of analysis process is basically formative evaluation. Summative evaluation of outcomes from the changes will become more important in future evaluations, but some information can be gained from initial implementations.

Specific statistical analysis indicates that there were increases in the mid-term passing rate percentages for three of the four classes of Biology 1230 and 1240 during the 2007-2008 academic year compared to the prior academic year. Also, passing rate percentages increased between the mid-term and final grades for three of the four classes.

Final passing rate percentages and mean grade point averages for all sections increased from Fall 2007 to Spring 2008 for both courses. It should be noted that final passing rates for Biology 1240 are historically higher than Biology 1230 since students in 1240 have successfully passed 1230.

Table 1.
Mid-term and Final Grade Percentages for Biology I (1230) and Biology II (1240)

COURSE	SEMESTER	MID-TERM PERCENTAGE PASS RATE	FINAL PERCENTAGE PASS RATE	MEAN FINAL GPA ALL SECTIONS
BIOL 1230	Fall 2007	44%	46%	1.65
	Spring 2008	45%	56%	1.89
BIOL 1240	Fall 2007	52%	51%	1.62
	Spring 2008	54%	68%	2.16

Microbiology Lab

For Microbiology lab, the existing exercises were reviewed and revisions were made with the input of all members of the departmental Microbiology Committee. A test-bank of new 20 application based questions and questions based on their assignments was developed. Dr. Shubha Kale Ireland implemented changes in two sections of Biology 2010L and conducted an item analysis of test questions for those sections. Her analysis indicated a 64% average item score for fact-based, memorization questions and 56% average item score for more difficult questions that require application and synthesis of learned facts. This represents success, based upon test theory guidelines of 50% average item scores.

Formative and summative program evaluations will continue during Summer 2008 as data are gathered and analyzed to determine how the implemented changes should be refined and to further assess student outcomes. Faculty members will be surveyed to obtain their observations and suggestions regarding the revised curriculum, as well as opinions concerning any adjustments which may be considered. Analysis of student outcomes will also include assessment of individual grant components such as Tutoring Center usage and correlation of student performance with specific modules.

iii) Opportunities for Student Training and Workforce Development

Lab-bench based research

Approximately 40 % of the Biology faculty members were engaged in externally or internally funded research during the year one of the PKSFI project. Each faculty member actively involved undergraduate students (on average 2-3 per faculty member) in his/her research project during the academic year and/or during the summer. This activity exposed the student participants to various angles of research, helped them decide if they truly enjoyed working in a research environment and better prepared them for their future.

Tutoring Center activities

The Biology Tutoring Center (please see below) allowed the upper-level students who were hired as tutors an excellent opportunity to obtain a foundation/training in being instructors. In addition, such meetings encouraged students to form informal groups and teach each other the more difficult topics of Biology.

Plans for off-campus student-research training

As outlined in the proposal, research has been conducted to identify institutions, businesses and research programs to establish student research internships to obtain more formal training in the areas of biomedical, biotechnological or application-based research projects. These will be implemented starting Fall 2008.

iv) Problems Encountered

Delay in purchasing and optimizing 'Clickers' (electronic personal responders)

As explained in earlier sections, most of the PKSFI Biothrust 21 outlined goals for year one were accomplished. However, one subproject, that of purchasing and optimizing the electronic personal responders had to be started a little later than expected. This is because this project was more directly dependent on the availability of the funds. The timing of the arrival of the PKSFI funds (past summer 2007) and the time that it took for the appropriate accounts to be set up internally at Xavier (well into late Fall of 2007), slightly delayed this project. However, upon conducting research and consulting with the IT department of the university (spearheaded by Dr. Mary Carmichael), the units have been purchased through Hyper-Interactive Teaching Technology, LLC. The goal is to optimize these this summer (Summer 2008), for classroom deployment during the 2008-2009 (year 2) academic year.

Setting up Internships in local bioscience laboratories and industry

Dr. Gene D'Amour **(**Senior Vice President for Resource Development) spearheaded the efforts to identify and establish contacts with local industry and bioscience laboratories. While contacts were made with major organizations devoted to biosciences such as Pam Labs, Reliagene and Greater New Orleans Inc., we discovered that very few opportunities existed in biomedical or biotechnological areas for undergraduate students, perhaps because, since Katrina, many of these businesses moved out of the greater New Orleans area. We have yet to hear from Reliagene but it appears that we will be able to set up an internship with them as a few of our students have worked in their labs. We still would like to continue with this internship program, but would like to target more of the USDA, SRRC labs which house several cutting-edge, biotechnology-based projects. In addition, we would like to set up formal internship programs with specific departments at the local research intensive institutions like LSU Health Sciences Center, Tulane University and University of New Orleans in application based areas such as Neurobiology, Gene Therapy and/or Cancer Research. Depending on the availability of these programs, we will design internships for selected students, through the 2008-2009 academic year and/or during the Summer of 2009.

III. Contributions

i) Efforts made to provide significant improvements to undergraduate science education

The two Biology courses which are at the center of this proposal (Biol 1230 and Biol 1240) are not only core courses for all Biology majors (totaling over 800 students) but are also required courses for all Chemistry pre-med majors, Psychology pre-med majors and pre-Pharmacy students (for a combined total of over 300). Furthermore, these two courses are pre-requisites for all upper level Biology courses, many of which are also taken by non-Biology, pre-med majors. If the instructors are unable to cover some modules or the modules are not covered in the appropriate depth, students typically miss out on getting introduced to those (uncovered) topics. The students thus have difficulty later on when taking upper level Biology courses, since these assume (and require) that specific knowledge was acquired during the Biol 1230 and Biol 1240 (General Biology) sequence.

For reasons described above, implementation of every single activity related outlined in the proposal and described in this report has a direct and a positive impact on undergraduate science education at Xavier.

ii) Building institutional capacity, ensuring project sustainability and/or scalability

Office of Academic Enhancement

Prior to the start of the Fall 2007 semester, the University launched an integrated and comprehensive program designed to allow all freshmen to make a smoother transition from high school to college by providing these students with the tools needed for college success. This program was developed by the newly established Office of Academic Enhancement, headed by Dean Kenneth Boutte, who was formerly the Associate Dean of the College of Arts and Sciences.

The goals of the Freshman Year Experience are to empower freshmen with the skills and support needed for college (Xavier) success, enhance their professional development, and understand their role and mission as Xavier students. Through this program, Xavier students are exposed to the mission of XU, the vision of St. Katharine Drexel, University policies and procedures, skills for academic success, academic support programs and other resources, means to achieve physical, mental, and spiritual well-being, skills and behaviors for professional success, fiscal responsibility, campus organizations and co-curricular activities and use of technology.

The Freshman Year Experience includes the New Student Orientation, the Freshman Seminar courses (FRSM 1000 and FRSM 1100), student monitoring and mentoring, a freshman book reading, and a common theme that can be used in first-year courses.

The Biology Tutoring Center

In the Fall 2007 semester, the Biology Tutoring Center was opened early October. Students used it through the end of November as final exams were scheduled for the first week of December. In Spring 2008, the center was open for about three months, from the end of January through the third week of April. In both semesters, peer tutors (an average of four per semester) were hired through a selection process. The hours of operation of the center totaled about 25-30 hours/week. During the few times when the tutors were unavailable because of their own class schedules, faculty members (for example, Dr. Labat and Dr. Bandaranayake) volunteered to tutor/assist the students. Students were requested to sign the attendance log, and while most did some (estimated at 10% or so), forgot to do so. Based on the attendance log, a total of 200 students used the Biology Tutoring Center exclusively for Biol 1230 and Biol 1240. In the Fall 2007 semester, a majority of students, 84%, used the center for Biol 1230 while in the Spring 2008 semester, a majority of the users (82%) were in Biol 1240. These numbers are in expected ranges as more students take Biol 1230 in the Fall, while more students take 1240 in the Spring. The goal of the department is to increase the numbers of students using the center during the 2008-2009 academic year

Advising

Academic advising has always been a significant component of all academic programs at Xavier. During the academic year 2007-2008, Sister Grace Mary, SBS and Professor of Biology, continued to serve as the Coordinator for Advising.

In the summer of 2007, with the approval of the administration, the Biology department hired Ms. Renada Fruga, a former XU graduate, as the Assistant Coordinator for Advising. This addition of personnel has provided much-needed assistance for student mentoring and is playing a significant role in accomplishing the goals of the PKSFI Biothrust 21 proposal.

In year one, four 'Advising workshops' for faculty were organized and each biology major was assigned a faculty member as an advisor. Biology faculty assisted their advisees regarding course selection during registration. In addition, students enrolled in General Biology and General Chemistry were required to 'self report' their grades on advisor cards and have these signed by their advisors weekly. This process promotes early identification and intervention in cases where students are experiencing difficulties and need assistance in obtaining appropriate academic support. Also, it allows students to get to know their advisors (and *vice versa*). In order to encourage the intended use of these advisor cards, students are rewarded with a bonus point each time they submit a signed card. While these points do not significantly alter their final grades, they do assist in the areas mentioned. In addition to the formal academic advising of students, faculty also volunteer to serve as advisors to a number of discipline-oriented clubs. These include a chapter of Beta Beta Beta, the national Biological Honor Society, the pre-dental club, the pre-vet club and the Biology club.

University-funded Release Time Slots to Supplement the PKSFI funding

During the 2007-2008 academic year, the university (through the VPAA's office) devised a new scheme where each department would receive a total of 'X' number of release time slots (where X = total number of faculty in the department) per academic year, for pedagogical and lab-bench based research projects. This has been an excellent opportunity for several projects in the department. This university-funded means will be used to supplement the funding by the PKSFI Biothrust 21 program for revision of the BIOl II (1240) labs. We will thus be able to have more than adequate assistance for this project, which will require a substantial amount of work.

IV. Project Revisions

As explained in earlier sections, two subprojects are still ongoing because of a slight delay in their start date. However, no major changes are to be reported in the PKSFI Biothrust program in that, all the goals and overall plans for year two remain unchanged.