

**COVER PAGE FOR TRADITIONAL AND UNDERGRADUATE ENHANCEMENT PROPOSALS
BOARD OF REGENTS SUPPORT FUND, FY 2008-09**

1. This Proposal Involves: <input checked="" type="checkbox"/> One Institution <input type="checkbox"/> More Than One Institution		2. Enhancement Subprogram: <input type="checkbox"/> TRADITIONAL ENH Program (Includes all multidisciplinary proposals) <input checked="" type="checkbox"/> UNDERGRADUATE ENH Program	
3. This Proposal Is: <input checked="" type="checkbox"/> Primarily an Equipment Request <input type="checkbox"/> Not Primarily an Equipment Request			
4. Name(s) of Submitting Institution(s) of Higher Education Louisiana State University And A&M College - Shreveport Additional Institutions			
5. Address of Institution of Higher Education			
6. Title of Proposed Project Strengthening of Student Preparation in the Biological Sciences through Training in Inquiry and Computational Biology			
7. First-Year Support Fund Money Requested \$36400	8. Second-Year Support Fund Money Requested (if applicable) \$0	9. Proposed Duration 1 Year	
10. Category In Which Proposal Is Being Submitted <input checked="" type="checkbox"/> Biological Sciences <input type="checkbox"/> Engineering B (Industrial, Materials, Mechanical, etc.) <input type="checkbox"/> Humanities <input type="checkbox"/> Computer and Information Sciences <input type="checkbox"/> Social Sciences <input type="checkbox"/> Special Multidisciplinary (See Section III.B.2.c of the RFP.) NOTE: If you check this category, you must also check at least one other eligible discipline.)		11. Taxonomy Numbers: 0299 Genomics, Biological Inquiry, Computational Biology 0209 Entomology and Parasitology 0608 Immunology	
12. This Proposal Is a: <input checked="" type="checkbox"/> New Request <input type="checkbox"/> Request for Continuation of a Previously-Funded Support Fund Project Previous contract number:			
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) <u>Grants for Research and Education in Science and Engineering</u> , NSF Grant Proposals Guide (GPG), NSF 03-2, effective 10/1/02, and (b) 45CFR 620, Subpart F (Requirements for a Drug-Free Workplace).			
Name (type or print)	Dept./Telephone No.	Degree/Year	Signature
Lead PI			
Campus Head or Authorized Institutional Representative	Dean		Authorized Fiscal Agent
Name/Title/email: (type or print)	Name/Title/email: (type or print)		Name/Title/email: (type or print)
Signature:	Signature:		Signature:
Date:	Telephone Number:	Date:	Telephone Number:
Date:	Telephone Number:	Date:	Telephone Number:

BOARD OF REGENTS SUPPORT FUND ENHANCEMENT PROGRAM PROPOSALS
FY 2008-09
PERSONNEL PAGE

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This proposal requests support to purchase four machine vision workstations, each to include a webcam/microscope, computer, and computer-driven motorized stage. The workstations and supporting supplies will be used in quantitative behavior assays as part of new student training exercises to be implemented in three courses. The supplies will also support exercises in comparative genomics in two courses. The primary goals of the new exercises will be to train students to understand the process of scientific inquiry in the biological sciences and to give students direct experience with computer-based tools in biology. The courses include An Introduction to Biological Inquiry, which will be required for Biology majors beginning in fall 2009, Functional Genomics and Proteomics, Parasitology Laboratory, Immunology Laboratory and BIOS 110L Biological Principles I (our first course for entering freshmen). The new student activities will focus on interdisciplinary interactions between the biological and computational sciences. An anticipated outcome of the project will be to increase interactions among students and faculty in the biological sciences, computational sciences, mathematics and physical sciences. We believe the training of students in this new educational paradigm will encourage more of our students to pursue additional coursework in computational biology and bioinformatics. The strengthening of our curriculum will result in training students who will be better prepared for future studies or employment. Support will enable faculty to purchase equipment and supplies necessary for data collection, to write laboratory exercises, and to teach the pilot versions of the exercises.

**BORSF ENHANCEMENT PROGRAM
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Narrative

1. Current Situation

a. Institutional Description

Louisiana State University in Shreveport (LSUS) is the only senior public university in Shreveport, Louisiana's third largest metropolitan area (400,000 pop.) and the business center of the Ark-La-Tex region. The University currently serves 4,300 students, and minority students now make up 38% of the enrollment. As a comprehensive urban university, the institution is charged with serving the needs of a diverse and largely nontraditional student body. The majority of our students are the first in their families to attend college, and the median age of graduates is 27+. Thus adult learning principles and a significant variety in learning methodologies have always been appropriate and necessary to success in achieving the university's mission. This imperative to excellence in learning methodologies takes on increased urgency in the new education environment offered through Internet and digital technologies and the need for multi-institutional collaborations in order to provide cost-efficient educational opportunities. LSUS is fully accredited by SACS.

The Department of Biological Sciences occupies the second floor (23,000 ft²) of the 41 year old science building shared with the department of Chemistry/Physics. The department faculty consists of ten members, all of whom hold the degree of Ph.D. These faculty members educate approximately 350 majors per year and also serve about 300 students in the allied health sciences and health/science education with lower division courses. The Department has an average credit hour enrollment of 3,409 per semester and an average of 173 declared majors per year over the past seven years. The average number of graduates from the life sciences program for the last seven years has been 34 per year. The majority of graduates from the department of biological sciences have applied for admission to professional or graduate schools. Every summer, LSUS faculty members provide basic science instruction for the LSU Health Science Center Office of Multicultural Affairs' summer enrichment program to encourage minority students to pursue medical careers. On an annual basis, more than half of the students admitted to the LSUHSCS School of Allied Health (which accepts students from across the nation) are from the LSUS undergraduate pipeline. The curriculum in the Biological Sciences at LSUS serves students majoring in pre-medicine, biology, education (life science teachers), and certain allied health fields. The resources requested in this proposal will support curriculum development for strengthening initiatives in bioinformatics and biotechnology. The commitment of LSUS to support the development of laboratory courses demonstrates the strong institutional commitment to improve the quality of its undergraduate science courses and to enhance the potential for undergraduate research. This BORSF proposal for undergraduate curriculum enhancement will provide critical upper-level education in modern biology necessary to support our undergraduate curriculum reform efforts. The new resources requested in this proposal will provide a powerful and cost-efficient mechanism by which students can explore and reinforce their understanding in modern biology.

b. Rationale for the Project

Over the last several years, the LSUS College of Sciences has undertaken an evaluation of our programs and curricula in an attempt to maintain our excellence in training our students for graduate and professional schools and the workforce. We have worked with regional educational partners and local industries in an attempt to address needs for training. Based on these studies, we have put into place several major initiatives, including a Biotechnology focus, a Bioinformatics and Computational Biology focus, and an Environmental Biology focus. For each focus, we have hired new faculty and have developed curricula.

The LSUS initiatives are part of a major effort to create a pipeline of students, who are introduced to modern molecular and computational biology early, and have clear and well-designed opportunities for training. Caddo Parish Schools and the Biomedical Research Foundation of North Louisiana have initiated a “Biotechnology Academy” at Southwood High School, which has been developed into a Magnet program. Bossier Parish Community College has developed a series of courses for a biotechnology concentration area with federal funding. The Graduate School at Louisiana State University Health Sciences Center in Shreveport (LSUHSCS) has created a Biotechnology Track with the Ph.D. program. This track provides students with opportunities to complete training in biotechnology and intern in a biotechnology company. At LSUS, we have hired a recent Ph.D. in Biochemistry and Molecular Biology, Dr. Tara Williams-Hart. Dr. Williams-Hart and other departmental faculty have updated and revised our genetics and biotechnology courses. With support from the North Louisiana Partnership for Innovation and the BORSF, we are continuing development of curricula and training opportunities.

A second major initiative within the LSUS College of Sciences is Bioinformatics and Computational Biology. The Department of Computer Sciences has hired two faculty members who hold Doctor of Science degrees in Bioinformatics, Marjan Trutchl and Urska Cvek. These faculty members have developed several bioinformatics courses and work with faculty at LSUHSCS to support their research programs. The Department of Computer Sciences and the College of Sciences plan further development of degree programs in computer science and bioinformatics. LSUS has received support through an IDeA Networks of Biomedical Research Excellence (INBRE), National Institutes of Health award. This award funds bioinformatics and biotechnology research conducted by Drs. Trutchl, Cvek, Williams-Hart, and other LSUS faculty members.

Most recently, the Department of Biological Sciences has initiated the development of a Masters Degree Program in Environmental Biology. This initiative builds on the strengths of current faculty and two new hires, Amy Erickson and Matyas Buzgo. A goal of this proposal is to develop courses in the Department of Biological Sciences and exercises for existing courses that support and enhance the training of students in the areas of the initiatives. This proposal requests support for equipment, supplies and student stipends to develop exercises for students in the use of nematode communities as an environmental indication, machine vision analysis of nematode behavior, and comparative genomics. The exercises will be implemented in several courses throughout

the curriculum, including our entry level course for majors, BIOS 110L, and new courses for majors, BIOS 210 An Introduction to Biological Inquiry, two upper-level laboratory courses, BIOS 321L Immunology Laboratory and BIOS 380L Parasitology Laboratory and a BIOS 400/600 level elective: Functional Genomics and Proteomics. The primary goal of the exercises is to train students to think within the framework of modern molecular, genomic and computational biology approaches. The exercises will emphasize the need for interdisciplinary interactions among the biological, physical and computational sciences to address contemporary problems and the role of innovation and invention of new tools in the progress of science. We must train students in this new educational paradigm so that our students will understand the need to move freely among the science disciplines and to be competitive for future studies or employment. A secondary goal of the course is to increase interactions among students and faculty in the biological sciences, computational sciences, mathematics and physical sciences. Community building and interdisciplinary cooperation will provide a more robust educational environment and more opportunities for faculty and students. This proposal will support further development and implementation of this program. Project support will enable faculty to purchase additional instructional resources, conduct enhanced laboratory exercises, and teach the enhanced courses.

National Need:

The National Academy of Sciences has recently published a report, "Rising above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future," in which they issue a call for immediate action to maintain our strength in science and technology. Although the United States has been world leader in science and technology for decades, U.S. advantages in the marketplace and in science and technology have begun to erode. There is an urgent need for comprehensive and coordinated federal efforts to bolster U.S. competitiveness and pre-eminence in these areas. The report was requested by the U.S. Congress and was written by a 20-member committee that included university presidents, CEOs, Nobel Prize winners, and former presidential appointees. Some indicators of a weakened US position include that U.S. 12th-graders recently performed below the international average for 21 countries on a test of general knowledge in mathematics and science and that in the study year only 41 percent of U.S. eighth-graders had a math teacher who had majored in mathematics at the undergraduate or graduate level or studied the subject for teacher certification -- a figure that was considerably lower than the international average of 71 percent. "America must act now to preserve its strategic and economic security by capitalizing on its knowledge-based resources, particularly in science and technology, and maintaining the most fertile environment for new and revitalized industries that create well-paying jobs," said committee chair Norman Augustine, retired chairman and CEO of Lockheed Martin Corp. "The building blocks of our economic leadership are wearing away. The challenges that America faces are immense."

State and Area Needs:

The goals and objectives of Louisiana's state economic development plan include recognition of the need for workforce education in science and technology in order to be able to compete. The Director of the Biomedical Research Foundation of Northwest

Louisiana recently wrote an editorial published in The Shreveport Times in which he identifies “innovation” as our greatest renewable resource. It is the charge to those of us teaching at the college level to educate our students about the opportunities and challenges facing scientists today. This proposal addresses the need by providing high-level training in modern biology. The proposal also addresses workforce training concerns of partner institutions and industry. It supports institutional and regional initiatives to strengthen the workforce to be competitive and promote economic development.

c. Impact on Existing Resources

The resources requested in this proposal will be used to enhance the laboratory teaching in the biological sciences. The project builds upon previous success in our BORSF supported enhancement projects which have been well received by both students and faculty. Equipment that was purchased with previous BORSF support for Biological Sciences will be used in this project, as well as equipment on hand from Federal granting agencies and LSUS Technology Fund monies. The new resources requested will directly complement and expand the use of currently-owned equipment. (See list of equipment.) Furthermore, the machine vision workstations will provide students with an early exposure to research and innovation in the areas of environmental biology and computational biology, and will prime students to explore a wider range of upper-level courses. Students will also be trained in essential skills to understand the nature and process of modern science. Thus, the support requested in this proposal will have a significant impact on the education of our students at several levels throughout the Biological Sciences curriculum and other College of Sciences curricula.

2. THE ENHANCEMENT PLAN

a. Project Goals and Objectives

The overall goal of this project is to enhance the University’s training of students, to further interdisciplinary endeavors in the sciences, and to help faculty and students more fully benefit from the integration of research and education. More specific objectives are as follows:

- ◆ To enhance instruction and student learning in an introductory laboratory course: BIOS 110L
- ◆ To support the development of a new required course for Biological Sciences majors: An Introduction to Biological Inquiry
- ◆ To further the development of an upper-level BIOS elective: Functional Genomics and Proteomics.
- ◆ To enhance the development of student exercises in comparative genomics in BIOS 321L Immunology Laboratory and BIOS 380L Parasitology Laboratory
- ◆ To enhance undergraduate student participation in research

b. Work Plan of Proposed Project

Objective: To enhance instruction and student learning in an introductory laboratory course: BIOS 110L BIOS 110L Biological Principles I Laboratory

Since Fall 2007, the faculty of the Department of Biological Sciences has team-taught this course. Each faculty member teaches all sections of the course for one week (typically four or five sections of 45 students per section). Each faculty member leads inquiry exercises based on his or her research area. Goals of this design include community-building, and educating students about opportunities in coursework and research. Dr. Aamodt's program has focused on the nematode, *C. elegans* as a model organism for development and the study of aging and disease. To better align the exercise with the BIOS 110 lecture content and the Departmental focus in Environmental Biology, Dr. Aamodt is modifying the exercise to include nematodes as an environmental indicator organism (<http://aboutbiodiversity.org/soil/indicators.htm>), and classical and molecular approaches to nematode systematics. With funding of this proposal, the exercises will also include computer vision analysis of morphology and motion of nematodes. Students will rotate through exercises which will give them experience with the interdisciplinary nature of environmental biology. The machine vision workstations will each include a computer, a Dino-Lite microscope/webcam and a motorized stage driven through a serial port (<http://www.mrc-lmb.cam.ac.uk/wormtracker/>). Software was specifically designed for motion and behavioral analysis of nematodes and is available free.

Objective: To support the development of a new required course for Biological Sciences majors: BIOS 210 An Introduction to Biological Inquiry

The PI developed this in 2007-2008 and taught pilot versions in Spring 2008 and Fall 2008. The course was created to "teach students to think" and to develop skill needed for scientific investigation. Based on student feedback and evidence of need for this training, the Department of Biological Sciences decided in Fall 2008 to make BIOS 210 a required course for the Biological Sciences curriculum. BIOS 210 will be taught in Fall 2009, in two sections with an expected total enrollment of 200. Students will learn to read scientific papers, and access digital libraries and databases. Students will work with data and learn to make observations, draw conclusions, pose testable questions and analyze data. New exercises that use data from LSUS faculty research are being prepared.

The prerequisites for BIOS 210 are BIOS 110, 110L, 120, 120L Biological Principles I and II. Students enrolled in BIOS 210 may have earned credit for the prerequisites through a dual enrollment program or transfer from another university. While the primary goal of BIOS 210 will be to train students in essential skills, a second goal will be to introduce students to research opportunities with LSUS faculty. Students will also learn the importance of innovation and the invention of tools and techniques in the advancement of science.

In addition to exercises based on her research, the PI will work with other faculty to create learning modules based on their research.

Objective: To enhance instruction and student learning in the new course developed as a BIOS 400/600 level elective: Functional Genomics and Proteomics.

This course is based on the textbook of the same title written by Malcolm Campbell, Davidson College. Since the completion of sequencing of the genomes from dozens of different organisms, the approaches to the study of life at the research level have undergone a profound change. The types of questions asked, the tools used and the application of information have changed. Malcolm Campbell's consortium to facilitate undergraduate student experiences with genomic research, Genome Consortium for Active Teaching (GCAT) (<http://www.bio.davidson.edu/projects/GCAT/gcat.html#mission>), and supporting materials for his undergraduate course based on the textbook (<http://www.bio.davidson.edu/courses/genomics/genomics.html>) reflect the magnitude of the need to update and reform undergraduate education in the biological sciences. Dr. Aamodt developed and taught Functional Genomics and Proteomics in Spring 2009 with the support of BORSF funding. In this proposal, the PI requests support to refine and further develop our course and laboratory in Functional Genomics and Proteomics. Our course uses Dr. Campbell's textbook and collaborates with the GCAT. The course complements existing courses taught in the Departments of Biological Sciences, Chemistry and Physics, and Computer Sciences. Students in the course conduct exercises with DNA microarray data. Microarrays for the model organism, *C.elegans* are available through the GCAT. The reagents for the experiments are expensive and most universities in GCAT have Howard Hughes Medical Institute funding. Support for reagents is critical for student experience with these methods.

The students also carry out investigations in proteomics. Proteomics is the large-scale study of [proteins](#), particularly their structures and functions. One organism will have radically different [protein expression](#) in different parts of its body, in different stages of its life cycle and in different environmental conditions. The PI developed a *C. elegans* assay using genetic and proteomic approaches, and has developed student projects based on this work. The use of student laboratory exercises that are based on current scientific research has been successfully accomplished in several courses at LSUS. For example, Dr. Williams-Hart has involved students in her yeast research in BIOS 465/665 Advanced Biotechnology and Dr. Dalton Gossett has had students conduct plant physiology and environmental science research in several of his courses. We find that this approach allows many students to benefit from research experience.

The program will expand the use of the model organism *Caenorhabditis elegans* (*C. elegans*) as a tool for teaching. *C. elegans* is widely used as a model organism for pursuing research in developmental biology and neurobiology. Due to its value as a research tool, a sophisticated knowledge infrastructure has developed, with freely disseminated research methods and protocols. The experimental attributes of *C. elegans* that make it successful in research laboratories also make it a favorable organism in teaching (<http://www.loci.wisc.edu/outreach/text/celegans.html>)

The sequence of the *C. elegans* genome has been completed, and the next important task is to determine the function of each of the predicted genes. In *C. elegans*, it is possible to use RNA interference (RNAi) to obtain a good indication of the likely loss-of-function phenotype (“knockdown”) in that gene. An RNAi experiment can be performed by feeding the nematodes bacteria that has been transformed with the sequence of interest. These bacteria have been prepared by Dr. Julie Ahringer and are available to nonprofit groups for a modest cost. Students simply allow nematodes to feed on an RNAi clone, and then observe changes in phenotype or behavior. Students will use the machine vision workstations to collect and analyze data from RNAi experiments and will pursue the function of the gene through literature and database studies.

Objective: To enhance the development of student exercises in comparative genomics in BIOS 321L Immunology Laboratory and BIOS 380L Parasitology Laboratory.

BIOS 321L Immunology Laboratory. Until 2006-07, this course had not been taught for several years at LSUS. With laboratory fee support, it was targeted for re-introduction to the curriculum and is now once again available to students. The laboratory allows students to gain direct experience with important techniques and concepts. With the requested support, we will enhance the recently developed series of exercises with comparative genomics. Recent advances in immunology have revealed that genetic inheritance in major histocompatibility genes (MHC) plays a role in immune system function and susceptibility to disease. The new laboratory exercise will provide students will an opportunity to explore and understand tools and results in comparative genomic studies in immunology.

BIOS 380L Parasitology Laboratory. This course has been taught through a traditional descriptive zoology approach. Recent advances in parasitology have been based on the use of molecular and genomic techniques. Following the retirement of the faculty member who previously taught Parasitology, the PI has assumed responsibility for the course. Dr. Aamodt will develop exercises that allow students to use modern approaches that are important to understanding “post-genomic” parasitology. Students will engage in inquiry exercises in comparative genomics (<http://www.nematode.net/index.php>) which use the wealth of information about the free-living nematode, *C. elegans*, to gain insight into the biology of parasites that cause devastating human diseases. Students will also explore the genomic databases for protozoan parasites.

Objective: To enhance undergraduate student participation in research:

Addition of the new resources will enable more and improved hands-on experience for students, enabling students to obtain a better understanding of genomics and proteomics. Faculty members will utilize the new resources, along with our existing equipment, for course instruction and to enrich research opportunities for undergraduate students. To broaden access to such opportunities, the project requests a modest amount for student research stipends which will enable some upper level students to participate with faculty in genomics and proteomics research projects.

Project support for enhancing opportunities for undergraduate students to participate in research will broaden the background of our students and help attract/retain students of high quality. Students' knowledge and skills are honed through research participation, and graduates with such experience are in demand by employers and in advanced academic programs throughout the nation. Research participation can enhance students' teamwork, communication, and presentation skills, which are highly valued in the workplace. Involvement in research is also a key method to recruit and retain high quality students.

LSUS, a non-doctoral institution, lacks large research grants or corporate support to finance many student research stipends. Yet even at undergraduate institutions, students need opportunities for first-hand participation in faculty-led and independent research projects. Many LSUS students take longer than four years to complete baccalaureate degree programs, mainly due to work and/or family responsibilities. According to the annual ACT survey 76% of LSUS students must work to afford college. A major problem affecting many of our students is lack of financial resources to cover cost of attendance. Financial need is perhaps a more serious impediment to timely completion of science and technology-oriented baccalaureate degrees because the course load and academic rigor is often not compatible with long hours of outside work. A modest amount for student stipends will allow upper-level students to participate in outside of class research, for which appropriate credit is offered. Student applicants will be selected based on faculty recommendations, demonstrated interest, grades in pertinent courses and commitment to completing research efforts.

Students will collect soil samples from previously identified areas under investigation by faculty in the Red River Watershed Institute at LSUS. Nematode communities will be isolated, identified and analyzed using morphological and molecular methods. Machine vision workstations will be used by students to document and analyze nematode species and behavior of worms exposed to various environmental conditions. Student stipend s requested in this proposal will compensate students for research. Students with research experience will be recruited to assist with teaching activities based on the research in BIOS 110L and 210.

Further benefits:

Dr. Aamodt has an extensive background in science education reform, and experience in science education for elementary education majors and in-service teachers. A future goal is to move more modern biology into workshops for teachers. The education of the workforce is more effective when students are introduced to math, science and technology in a meaningful way at early stages in their training. With BORSF Post-Katrina Support, faculty at LSUS are developing learning modules for use in area high schools. As the development of the project proceeds, Dr. Aamodt will prepare a learning module and present it at a teacher workshop.

Schedule:

Project funding period is July 1, 2009, to June 30, 2010.

GRANT MONTH

ACTIVITY	1	2	3	4	5	6	7	8	9	10	11	12
Grant start up	X											
Request bids for new resources	X											
Receive/evaluate bids		X										
Purchase new resources		X	X									
Install new resources in labs			X	X								
Begin student use			X	X	X	X	X	X	X	X	X	X
Update/revise laboratory exercises			X	X	X	X	X	X	X	X		
Purchase and prepare supplies				X	X	X	X					
Evaluate Results							X					X
Report to BORSF												X

Given an award date of June or July 2009, the principal investigator will be afforded sufficient time to complete the project by June 2010.

c. Evidence of Potential to Achieve Recognized Eminence: The current ten faculty members in the Department have expertise in all major biological disciplines. Most members received their terminal degrees from top-level academic institutions from a wide variety of geographic locations, bringing together a diversity of experience and educational philosophies to the program. All faculty members have active research programs which have resulted in over 90 publications and 75 paper presentations at scientific meetings during the past 10 years. The majority of this research has been conducted with the assistance of undergraduate students. Grants have been obtained from sources such as the National Institute of Health, The American Heart Association-LA Inc., the National Science Foundation, the Magale Foundation, the Frost Foundation, the Louisiana Department of Education, the Biomedical Research Foundation of Northwest Louisiana, BoRSF, and the LSUS Faculty Research and Development Committee. The publication rate has increased, and additional students are participating in research. Because of this growth and commitment to a quality undergraduate instruction and research mission, the majority of graduates from the department apply for admission to graduate or professional schools.

Community service is an important part of our mission. We have hosted two NSF Young Scholars programs in which high school science students participated in faculty-led research. The faculty is very active in outreach programs designed to foster science-related activities. LaPREP, a summer science enrichment program for minority and women school students has won national acclaim as a “model program” from the US

Department of Education Minority Science Improvement Program and US Department of Energy. Science faculty assisted in the establishment of SciPort, a "hands-on" science museum and serve on the board.

The LSUS College of Sciences has taken the lead in applying innovations in science education reform to its degree programs. Guided inquiry laboratory work is now a major part of our science courses. The undergraduate research program at LSUS is well into a transition from the original strictly teaching mission to a balance of instruction and research. In recognition, the National Science Foundation awarded the College of Sciences an Academic Research Infrastructure (ARI) grant of \$1.47 million (largest NSF-ARI award ever given in Louisiana). All faculty are active in research and seriously involve students in their projects. During the past five years 300 students have participated in faculty-led research projects, and LSUS has been officially recognized by the Board of Regents for excellence in involving undergraduates in research. Examples of grants received by our faculty to enhance undergraduate science education include: \$101,000 NSF-RUI, \$165,000 Governors Biotechnology Initiative Grant, \$480,000 EPA grant, and \$199,000 in Industrial Ties Research grants.

d. Impact on Curriculum and Instruction:

To coincide with national trends in undergraduate science education, we are developing courses to directly improve the quality of instruction by integrating research and education and by expanding student access to modern equipment and supplies for training in "real-world research" experiences. The Functional Genomics and Proteomics course and laboratory introduces students to techniques in functional genomics and proteomics. The long-term goal of the courses is to train students "to successfully undertake careers in research after graduation." With the requested resources, we will be better able to provide students with significant "scientific knowledge, practice with experimental design, utilization of quantitative abilities, and exercise of communication skills." Furthermore, the new resources will contribute to our overall efforts to train and prepare young scientists for a new generation of research challenges that have direct relevance to modern science and technology and economic development.

e. Impact on Quality of Students

This enhancement project will add to our abilities to recruit and retain top students from area high schools, including more women and minorities, to entering pre-medicine and other health and science related career paths. Enhancement of the targeted courses is expected to attract high quality undergraduate students to the study of biotechnology and related scientific fields. Laboratory projects using the new resources will improve the analytical and problem solving skills of our students, making them more competitive in their academic and career paths. Approximately 150 students annually will benefit from the project. A major benefit of the enhanced curricular offerings will be that students will have a deeper understanding of the discipline which will be a direct benefit to our workforce. A greater pool of well-trained graduates will increase the likelihood of new industries becoming established in Louisiana. The final result will be the production of a greater number of higher quality, more marketable graduates.

f. Impact on Faculty Development.

The proposed project will have a definite positive impact on faculty development.

Acquisition of new resources for biology instruction will enhance the faculty members' ability to teach upper-level courses and will attract more students to our programs. Most of the faculty members in the department utilize biotechnology, cell biology and molecular genetics in their research programs and include the participation of undergraduate and graduate students. Subsequently, students who participate in faculty research programs take senior-level undergraduate and graduate-level independent research courses will also be affected. The specific projects will be approved and arranged between instructor and student(s). Students will be encouraged to present the results of their research projects at appropriate scientific meetings. It is predicted to receive widespread support, and students with an interest in research or graduate school are very interested in taking this course as an elective. In its most recent evaluation, the Board of Regents Regional Program Review team stated: "The caliber of the faculty at LSU-Shreveport is very high. All are meeting the triad of teaching, research, and service in various ways. Considering their heavy teaching load, the Committee commends the faculty for active role in research, especially where it has involved undergraduates. A successful project is catalytic and will inspire others in the department and college to venture forth with projects and to seek external funding. The proposed project will also improve our ability to attract the highest quality new faculty members as we fill vacancies in the years ahead.

g. Performance Measures:

The evaluation of project impact on student progress and success will be made using three main criteria. The first of these is the Major Field Exam from the Educational Testing Service. The current average performance of our students is in the 65th percentile nationally. Since this project will impact a wide range of course offerings we anticipate an improvement in the performance of our students on this test in the future.

The second method that will be used to evaluate the success of this project will be by carefully examining the student's own evaluation of the laboratory course. LSUS invites students in all courses to annually evaluate course content, grading structure, instruction methods, and teaching materials both numerically and verbally. This evaluation is carried out by using the Student Instructional Report (SIRII) instrument. Records of these evaluations are kept so student opinions can be monitored over time. Quantitative and qualitative measures will be used to document project effectiveness. By the end of the grant project and the end of the academic year, approximately 150 students will have received one or more hands-on experiences utilizing the resources provided by this project, with at least 75% indicating a positive experience in the end-of-course student satisfaction survey.

The third method that will be used to evaluate the success of the project will be to monitor the employment success of LSUS students that are employed at LSUHSC-Shreveport and other institutions. Many LSUS pre-health sciences students are employed as student workers, laboratory technicians, and/or research associates. We will formulate an LSUS student performance report that will be mailed to all faculty members at LSUS and LSUHSC-Shreveport to assess the skill level of LSUS students within the first six months of employment. Faculty writing letters of reference for students who have completed the training will be given detailed statements of the skills and competencies

that the students have mastered. These students should find it very easy to find employment as a research technician in Louisiana, or in research laboratories elsewhere. The results from the second and third assessment methods will be reported in the BoRSF final report.

The PI will submit to the Board of Regents the following reports, in accordance with the BORSF timetable, and in the format specified by the Board: Final Project report on June 30, of 2010; and a Final Expenditures Report on September 30, 2010. All publications, presentations, etc. that result from this work will cite the support of the Board of Regents Support Fund, with the appropriate contract number cited.

3. Equipment

a. Equipment Request

For use in student laboratories, student research: 4 computer-vision (quantitative motion analysis) workstations, each to include a computer, microscope webcam and a motorized stage driven through a serial port:

A PC, \$2000.

A Dino-Lite microscope/webcam.

Dino-Lite Pro - AM411T/AM413T 1.3MP Digital Microscope

With stand, price: \$500.00

A motorized stage driven through a serial port: Zaber's Motorized Rotary Stage with Integrated Controller, \$2,000.00

4 Workstations at \$4,500.00 each: \$18,000

b. Equipment On Hand for the Project

The Department of Biological Sciences currently possesses a number of equipment items related to the proposed project such as two refrigerated growth incubators, twelve top-loading balances, six BIO-RAD SmartSpec UV-visible spectrophotometers, electrophoresis and chromatography equipment, a BIO-Homogenizer, a variable wavelength microtiter plate reader, an electronic balance, a pH meter, a non-frost free freezer, two microcentrifuges, a Sorval high-speed refrigerated centrifuge, a -70 °C freezer and a thermocycler, student microscopes, computers, and other standard equipment. LSUS and LSU Health Science Center in Shreveport (LSUHSCS) have established a core analytical lab on the LSUS campus as a cooperative effort for research and instructional use by faculty and students at LSUS and LSUHSCS. This core laboratory is designed to support a multidisciplinary approach to scientific analysis. Laboratory instrumentation includes gas chromatography/mass spectroscopy, ion chromatography, atomic absorption spectroscopy, ultraviolet/visible spectrometry, and high pressure liquid chromatography. The laboratory is capable of performing many types of analyses pertinent to research and study. The laboratory is available, with supervision, to undergraduate and graduate students for hands-on, practical experience in laboratory analysis techniques, and the collection and interpretation of data. A full time, highly qualified lab manager/technician is on hand.

c. Equipment Housing and Maintenance

The new resources will be housed in the Department of Biological Sciences on the second floor of the main science building at LSUS. This building was completely renovated, with support from NSF-ARI (\$1.4 million) and from state capital outlay funds (\$4.5 million), providing upgraded space (HVAC, wiring, etc.) for the proposed Biotechnology Lab. Adequate maintenance, repair and technical advice is available from the LSUS technical staff who have considerable experience in installing and maintaining scientific equipment. Safety and security procedures are already in place to protect the equipment, faculty, staff, and students. Our institutional budget will provide annual operating supplies, materials, and maintenance. Maximum usable lifetime for the new resources will be ensured via regular maintenance by trained professionals.

4. Faculty and Staff Expertise

Project Director: Stephanie Aamodt, Professor, PhD, Vanderbilt University, investigates the molecular biology of development using *Caenorhabditis elegans* as a model organism. She has led a successful \$105,000 NSF-RUI grant project and received an award from the North Louisiana Partnership for Innovation to fulfill the Louisiana Vision 2020 goals of building a workforce with the education and skills to be competitive in the life sciences, biotechnology, and biomedical areas. Dr. Aamodt will have primary responsibility for carrying out this project and teaching the courses described in this project. She will also have major responsibility for coordinating interdisciplinary participation in the project.

Dr. Aamodt will be supported by the expertise of many other faculty members in the LSUS College of Sciences:

Gary Butcher, Associate Professor of Chemistry and Physics, Louisiana State University in Shreveport, received his Doctorate of Engineering at Louisiana Tech in 1987. He has extensive experience in engineering and robotics.

M. Emre Celebi, Assistant Professor, Department Computer Science, Louisiana State University in Shreveport, received his Ph.D. degree in Computer Science and Engineering from University of Texas at Arlington in August, 2006. His research interests include Medical Image Analysis, Color Image Processing, Content-Based Image Retrieval, and Open-Source Software Development.

Urska Cvek, Assistant Professor, Dept. of Computer Science earned her Doctorate. in Computer Science at University of Massachusetts in Lowell in 2004. Her research interests include visualization and data mining of large and complex data, with particular application to bioinformatics and cheminformatics data sets. Her past research work includes analysis of gene expression profiles in human cancer cell lines, yeast expression and several other proprietary profiles, mathematical modeling and visualization for environmental problem solving.

Tara Williams-Hart, Asst. Professor, earned a Ph.D. from LSU Health Science Center in Shreveport and a B.S. from Spellman College. She specializes in molecular biology and

yeast genetics and teaches the genetics and biotechnology courses. As a minority female scientist, she is a significant role model for students at LSUS.

Richard Thompson, Assoc. Professor of Chemistry, earned the Ph.D. from Oklahoma State Univ. He teaches Biochemistry lectures and laboratory courses. He came to LSUS from Abbott Laboratories where he was a pharmaceutical researcher and manager for 17 years. His industrial experience has included the metabolic regulation of monoclonal antibody production, computer modeling of erythromycin production, design of an expert system for controlling renal dialysis, and the development of medical diagnostic assays at Abbott labs.

Dalton Gossett, Dept. of Biological Sciences

Deborah Shepherd, Dept. of Mathematics

Marjan Trutchl, Dept. of Computer Science and others as needed.

5. Economic and/or Cultural Development Impact

a. Relationships with Industrial/Institutional Sponsors: The College of Sciences at LSUS has been successful in attracting industrial support as exemplified by the Pennzoil Corporation's donation of its St. Vincent Research Facility in Shreveport to the University. LSUS, a primarily undergraduate university, maintains a close partnership and several joint degree programs with LSU Health Sciences Center in Shreveport (LSUHSCS), a professional/graduate institution which includes management of the regional public hospital and a variety of public clinics. [LSUHSC operates the Charity Hospital System and provides public clinical and outreach services to low-income patients/clients in Louisiana.] Together, LSUS and LSUHSCS form one of only two public comprehensive health/medical professional education centers in Louisiana. The two partners' faculties have a history of cooperation including such activities as serving as adjunct faculty for each other, organizing and co-sponsoring conferences, conducting and presenting research together, partnering on grant applications, sharing equipment, and developing research/training institutes together. Coordination with other agencies such as Willis-Knighton Health System, Schumpert Medical Center, VA Hospital, other area hospitals/clinics, La. Department of Health & Hospitals, La. Rehabilitation Services, Biomedical Research Institute, non-profit and private service providers, assisted living centers, and other agencies is ongoing. Willis-Knighton Health System and the Dawson Foundation have donated over \$400,000 for scholarships to encourage minority and low-income students to attend LSUS. LSUS also works with local public schools to develop, expand and improve opportunities for students seeking careers in health, medical and related fields. For example, our faculty work cooperatively with Booker T. Washington High School's Health Careers Magnet Program. LSUS also maintains cooperative efforts with community colleges through articulation agreements with Southern University in Shreveport, Bossier Parish Community, Texarkana Junior College, and Panola Junior College, which this project will enhance by attracting more area students to LSUS's baccalaureate science programs.

b. Promotion of Economic Development & Cultural Resources

Promotion of Economic Development/Cultural Resources: With the educational experiences made possible by the proposed enhancement project, LSUS graduates will become an even more important regional resource. The State of Louisiana and the Biomedical Research Foundation of Northwest LA are working to promote further development in Shreveport's health/medical sector. LSUS has established ties to several area firms, including pharmaceutical companies and firms purveying health services. Among these are: Red River Pharma, Kinzie & Payne Biomedical, Morris Dickson Pharmaceuticals, Natural Solution, Orthoevolution, Ortho-Med, Sage Pharmaceuticals, and SteriFx. The LSU System's Shreveport research facilities and the Biomedical Research Institute, including the new \$15 million wet lab at Inter-Tech Science Park, form the core of a growing biomedical cluster in Shreveport. Inter-Tech Science Park, designed as a partnership of business, government, education and medical institutions is projected (over the next 25 years) to add at least 6,000 jobs with a \$225 million annual payroll and has already attracted several companies to Shreveport. LSUS's training efforts are a key asset in expanding the existing Shreveport biomedical cluster. The region is already developing as a leader in health care facilities and research, and there is a strong need for more personnel. According to the U.S. Department of Labor, of the 30 fastest growing occupations, 17 are health-related. Medical practitioners, technical occupations and care support occupations have a combined growth rate of 27.9% and are projected to add 2.7 million jobs. LSUS is a partner in the Louisiana Biomedical Research Infrastructure Network which is led by LSU A&M and funded by National Institute of Health/National Center for Research Resources (NIH/NCRR). Through projects such as this proposal, LSUS seeks to continue and enhance its cooperative biomedical research/education efforts that have clear economic development potential. By providing highly-trained personnel, modern biology instruction and learning enhancement at LSUS will contribute to long run economic development in Louisiana.

6. Additional Funding Sources

In addition to the substantial institutional match, we plan to leverage BORSF enhancement funds to increase our potential to secure additional funding from other private sources as well as from Federal sources. (The faculty have had success in securing funding from USDA, NSF, EPA, etc.)

PREVIOUS BORSF AWARDS

The PI, Stephanie Aamodt has a previous award of \$64,000 in 2002 for a computer laboratory that is still in use by students with upgraded equipment from institutional sources. She also received two BORSF awards in 1999 for microscopes that are also fully in use. In 2005, Dr. Aamodt received an award of \$28,462 to develop the initial course in functional genomics. In 2003, Dr. Aamodt was CoPI, with Drs. Tara Williams-Hart, Cran Lucas, and Stephen Banks, on an award of \$38,400 to develop the genetics laboratory. In 1996, they received a \$32,967 BORSF grant for upgrading our freshman lab. All previous BORSF projects were successfully completed and reported to BORSF. This project will use much of the equipment and related resources previously purchased with BORSF support and will expand the use of those resources.

BIOGRAPHICAL SKETCH

Provide the following information for the project director, co-project director, and other key personnel/consultants. Begin with the principal investigator/program director. Photocopy this page for each person.

Name Stephanie Jones Aamodt		Position Title Professor, Biological Sciences	
EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training.			
INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Vanderbilt University, Nashville, Tennessee	Ph.D.	1984	Molecular Biology
Bates College, Lewiston, Maine	B.S.	1977	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

Louisiana State University-Shreveport, Shreveport, LA:

2005-present Professor, Dept. of Biological Sciences
 2000-2005 Chair, Department of Biological Sciences
 1998-2005 Associate Professor, Dept. of Biological Sciences
 1993-98 Assistant Professor, Dept. of Biological Sciences
 1992-93 Instructor, Depts. of Biological Sciences and Chemistry
 1991-92 Adjunct Instructor, Depts. of Biological Sciences and Chemistry

2005-2006 Sabbatical, Louisiana State University Health Sciences Center-Shreveport. Dr. Tony Giordano, Director of the Biotechnology Program, mentor.

1977-79 Tufts University School of Medicine, Boston, MA
 Research Assistant, Dept. of Biochemistry and Pharmacology

RESEARCH PUBLICATIONS

E. Aamodt and S. Aamodt (2006) "Neural Specification and Differentiation" in The Neurobiology of *C. elegans*, Academic Press, 74-99.

S. Aamodt, P. Polk and E. Aamodt (1999) Deletion Mutation of *C. elegans* PTL-1, a Tau Homologue. *Molecular Biology of the Cell* (abstract).

S. Aamodt (1997) PTL-1, the tau-like microtubule-associated protein from *C. elegans*. *Dev. Biol.* 186: 302 (abstract).

J.B. McDermott, S. Aamodt and E. Aamodt (1996) *ptl-1*, a *Caenorhabditis elegans* gene whose products are homologous to the tau microtubule associated proteins. *Biochemistry* 35 (29): 9415-9423.

PROFESSIONAL PRESENTATIONS

S. Aamodt, P. Polk and E. Aamodt (1999) Deletion Mutation of *C. elegans* PTL-1, a Tau Homologue. American Society for Cell Biology Annual Meeting.

S. Aamodt (1997) PTL-1, the tau-like microtubule-associated protein from *C. elegans*. Society for Developmental Biology annual Meeting.

FUNDED GRANTS AND CONTRACTS

Regional Field Station Leader for

<http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=0817224>**FIRST IV: Faculty Institutes for Reforming Science Teaching for Postdoctoral Research Scholars**. First IV is supported by NSF DUE 0817224 to Dr. Diane Ebert-May, Michigan State University), start date 1/2009.

Louisiana Board of Regents Support Fund, PI: “Enhancement of Proteomics and Genomics in the Biological Sciences Curriculum”, 2006-2007, \$28,000. Funds for the development of new courses.

North Louisiana Partnerships in Innovation, “Pilot Study to Determine the Feasibility of a New Biotechnology Certificate within the Biology Degree Program”, Nov.1, 2004-Oct.31, 2005, \$10,000.

LSU-Shreveport Technology Fee Fund, Equipment and Software for Lecture Capture. 2004-05, \$14,945.

Louisiana Board of Regents Support Fund, PI: “Equipment to Enhance Teaching Genomics in the Biological Sciences Curriculum”, 2003-2004, \$64,000. Funds for the upgrading of the Biological Sciences Computer Laboratory.

National Science Foundation MCB 9604180: RUI, PI: PTL-1, A Tau-Like Microtubule-Binding Protein in *C. elegans*, 7/1/97 to 6/30/2002, \$105,000.

Louisiana Board of Regents Support Fund, PI: “Advanced Microscopy Workstations for the Enhancement of Undergraduate Education in Biological Sciences and Integrated Sciences”, 2000-01, \$35,000.

Louisiana Board of Regents Support Fund, PI: “Stereomicroscopes for the Enhancement of Upper division Courses in the Biological Sciences”, 2000-02, \$70,000.

NSF BIR 9602940, Biological Equipment and Instrumentation Resources Program, PI, A High Speed Centrifuge for Preparation of Biological Materials, 1997-98, \$21,393.

CURRENT AND PENDING SUPPORT

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

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

NAME OF INVESTIGATOR: Stephanie Aamodt

Status of Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future

Contract Number/Proposal Title: FIRST IV: Faculty Institutes for Reforming Science Teaching for Postdoctoral Research Scholars.

Source of Support: NSF DUE 0817224 to Dr. Diane Ebert-May, Michigan State University

Award Amount (or Annual Rate): \$ 4000 (consulting contract) _____ Period Covered: 1/2009 through 12/2009 _____

Location of Activity: Kellogg Field Station, Michigan and UGAMI, Georgia

Person-Months or % of Effort Committed to the Project: 5% Cal Yr ☐ Acad. ☐ Summer

Status of Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future

Contract Number/Proposal Title: Strengthening of Student Preparation in the Biological Sciences through Training in Inquiry and Computational Biology

Source of Support: BORSF

Award Amount (or Annual Rate): \$ 36,400 _____ Period Covered: 9/2009 - 6/2010 _____

Location of Activity: LSU-Shreveport

Person-Months or % of Effort Committed to the Project: ☐ Cal Yr 50% Acad. ☐ Summer

Status of Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future

Contract Number/Proposal Title:

Source of Support:

Award Amount (or Annual Rate): \$ _____ Period Covered: _____

Location of Activity:

Person-Months or % of Effort Committed to the Project: ☐ Cal Yr ☐ Acad. ☐ Summer

Status of Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future

Contract Number/Proposal Title:

Source of Support:

Award Amount (or Annual Rate): \$ _____ Period Covered: _____

Location of Activity:

Person-Months or % of Effort Committed to the Project: ____ Cal Yr ____ Acad. ____ Summer

**BOARD OF REGENTS SUPPORT FUND
TRADITIONAL AND UNDERGRADUATE ENHANCEMENT, FY 2008-09**

Budget Pages

Year 1:

	Support Fund Money Requested	Institutional Match ¹	Private/Other Match ²
A. Equipment ³	\$18000	\$5000 in cash	\$
B. Software	\$	\$	\$
C. Supplies	\$12000	\$3000 in cash	\$
D. Shipping/handling	\$	\$	\$
E. Installation	\$	\$	\$
F. Personnel training	\$	\$	\$
G. Other	\$6400	\$4000 in kind	\$
H. Indirect costs	Not allowed	\$	\$
I. Maintenance	Strongly discouraged	\$	\$
J. Total costs (A-I)	\$36400	\$12000	\$0

Year 2(Only if the proposed duration is 2 years):

	Support Fund Money Requested	Institutional Match ¹	Private/Other Match ²
A. Equipment ³	\$	\$	\$
B. Software	\$	\$	\$
C. Supplies	\$	\$	\$
D. Shipping/handling	\$	\$	\$
E. Installation	\$	\$	\$
F. Personnel training	\$	\$	\$
G. Other	\$	\$	\$
H. Indirect costs	Not allowed	\$	\$
I. Maintenance	Strongly discouraged	\$	\$
J. Total costs (A-I)	\$0	\$0	\$0

1 Stipulate whether in-cash or in-kind. The Board strongly encourages the sharing of costs for proposed projects. Applicants and institutional officials should note, however, that the employing institution will be required to honor the commitments made in the original proposal before any awards are made. Discounts for equipment purchases are not allowable as institutional match.

2 The budget page(s) must reflect and the budget justification pages must explain any external funds that are claimed in the proposal. External funds and their expenditure must be accounted for in the same manner as Support Fund money and institutional match.

3 Equipment. If applicable, itemize and describe briefly the proposed equipment and its intended use in the project. Include the name, model number, and manufacturer(s).

**BOARD OF REGENTS SUPPORT FUND
TRADITIONAL AND UNDERGRADUATE ENHANCEMENT, FY 2008-09
Budget Pages**

Composite Budget Page:

	Total Support Fund Money Requested	Total Institutional Match ¹	Total Private/Other Match ²
A. Equipment ³	\$18000	\$5000	\$0
B. Software	\$0	\$0	\$0
C. Supplies	\$12000	\$3000	\$0
D. Shipping/handling	\$0	\$0	\$0
E. Installation	\$0	\$0	\$0
F. Personnel training	\$0	\$0	\$0
G. Other	\$6400	\$4000	\$0
H. Indirect costs	Not allowed	\$0	\$0
I. Maintenance	Strongly discouraged	\$0	\$0
J. Total costs (A-I)	\$36400	\$12000	\$0

Budget Justification

The budget requests support to purchase four (4) machine-vision workstations for collection of data and analysis of nematode motion. These workstations will be used in the BIOS 110L laboratory taught by Dr. Aamodt, for data to be used in BIOS 210 Introduction to Biological Inquiry taught by Dr. Aamodt, and student research. Additional funds are requested for consumable supplies to support the cultivation of nematodes, to teach a course and laboratory in functional genomics and proteomics, and to substantially revise two upper-level laboratory courses, BIOS 380L Parasitology Laboratory and BIOS 321L Immunology Laboratory to include exercises that include genomics and modern molecular methods. The Institutional Match includes equipment, supplies, travel for the PI to attend the International *C. elegans* Meeting, and time contributed by faculty in the Departments of Biological Sciences, Computer Science, Chemistry and Mathematics. These resources will significantly expand the expertise and capacity of the Department of Biological Sciences at LSUS. The curriculum supports and dramatically strengthens initiatives in Computational Biology and Environmental Biology. The resources and curriculum do not duplicate any existing in the College of Sciences.

A. Equipment:

For use in student laboratories, student research: 4 computer-vision (quantitative motion analysis) workstations, each to include a computer, microscope webcam and a motorized stage driven through a serial port.

A PC running Windows XP, \$2000.

Minimum System Requirements

Processor: Intel Pentium 4 1.5G MHz

OS: Windows 98SE/ME/2000/XP/Vista/MAC OS 10.2

RAM: 512 MB

Drive: CD-ROM

Monitor: 16-bit color

Output Interface: USB 2.0

A Dino-Lite microscope/webcam.

Dino-Lite Pro - AM411T/AM413T 1.3MP Digital Microscope

With stand, price: \$500.00

Features include:

- * 10x-50x, 200x Continuous Magnification

- * Great Color Resolution

- * Live Imaging - Stills, Video, Time Lapse

A motorized stage driven through a serial port: Zaber's Motorized Rotary Stage with Integrated Controller Kits include all accessories typically required for operation. KT-RS60 Motorized Rotary Stage, 360 degree rotation, 60 mm diameter, Integrated Controller, Kit, \$2,000.00

4 Workstations at \$4,500.00 each: \$18,000

LSUS match:

This proposal builds on equipment purchased with BORSF and NSF support over the last ten years. Major equipment needed for laboratory exercises is available, and additional small equipment to be purchased by LSUS (pipettors, pH meters, etc.) will be used. University funds will be used for repair or replacement in the event of equipment failure.

C. Supplies:

One of the greatest needs for support for this project is for purchase of consumable reagents and supplies. Because of the demand in establishing three new laboratory courses over two years, there is a high demand for molecular biological reagents and supplies that cannot be supported by LSUS funds alone (LSUS match: \$3,000). Some of the items requested will have a long-term life and can be used to support student work for at least five years.

Categories of supplies:

Reagents for DNA Chip experiments: \$3,000

DNA chips, RNase-inhibitors, RNA isolation materials, enzymes, fluorescent dyes,

Nematode culture media and Petri plates: \$1,500

Supporting consumable reagents and supplies: \$7,500

Primary antibodies, secondary antibodies, culture tubes, buffers, filtration, western blotting membranes and detection, immunocytochemistry, PCR primers and enzymes, and related validation methods.

LSUS match: \$3,000 in cash.

G.1 Student Stipends

Undergraduate student research stipends: Upper-level undergraduate students will work with faculty outside of class on research projects. Students will be compensated for their work with research stipends. More than 76% of our students must work to afford college, so the stipends would enable more students to participate in research.

\$800 per semester, 4 students per semester for 2 semesters = \$6,400.

Students will assist with equipment set-up, carrying out experiments and data collection, analysis of data, and assisting with instruction in BIOS 110L and/or BIOS 210.

LSUS match: \$1,000 in cash for the PI to travel to the International C. elegans Meeting in Los Angeles to talk with colleagues about machine vision quantitative behavior assays. Dr. Aamodt will work with other LSUS faculty in the development of laboratory exercises. Faculty will contribute at least sixty hours at \$50.00/hr, for a match of \$3,000 in kind.

H. Indirect Costs

LSUS will cover costs of installation, maintenance and repair as needed.

Future funding plans:

Our yearly budget and laboratory fees will provide money for replacement, maintenance and repair to sustain this program for a minimum of five years. We will seek additional funds from Federal and foundation programs to continue to develop and expand our initiatives.