

DELTA STATE UNIVERSITY: ACADEMIC ANNUAL REPORT
Academic Year 2006-2007

I. Unit Title: Division of Biological and Physical Sciences

College: College Arts and Sciences

Unit Administrator: John Tiftickjian

Mission Statement

The mission of the Division of Biological and Physical Sciences is to provide quality instruction in the natural sciences, to encourage students to perform to their full potential, and to instill a scientific attitude that will develop scientifically literate, educated professionals. The Division seeks to develop the technical competence and the broad intellectual foundation needed to understand the impact of science and technology on humans and to make informed decisions on social, ethical, and environmental questions. The Division also endeavors to meet the general educational needs of the University; to contribute new knowledge in science, and science education; and to serve the needs of educators, other professionals, and communities within the service area.

II. Educational Program Learning Outcome Assessment Plan

<p>Learning Outcome</p> <p><i>What should a graduate in the biology major know, value, or be able to do at graduation and beyond?</i></p>	<p>Data Collection and Analysis</p> <p><i>1. What assessment tools and/or methods will you use to determine achievement of the learning outcome?</i> <i>2. Describe how the data from these tools and/or methods will be collected.</i> <i>3. Explain the procedure to analyze the data.</i></p>	<p>Results of Evaluation</p> <p><i>What were the findings of the analysis.</i></p>	<p>Use of Evaluation Results</p> <p><i>1. List any specific recommendations.</i> <i>2. Describe changes in curriculum, courses, or procedures were made/are being made as a result of the program learning outcome assessment process.</i></p>
<p>Biology, chemistry, and environmental science majors should be able to identify and apply the basic concepts taught in the core major courses</p>	<p>A “senior exam,” designed by faculty who teach core biology courses, has been given for the past several years for all biology and environmental science majors. The exam items are categorized so the weaknesses in core concepts can be identified. We currently studying the suitability of using a national ACS exam for similar use for chemistry majors.</p>	<p>Previous administering of the senior exam has suggested that improvement is needed in several core content areas, notably cell and molecular biology.</p>	<p>The curriculum committee has recommended changes to the first year biology sequence designed to introduce majors in a more cohesive way to core concepts. The first year biology major will now take a 2-semester general biology sequence rather than the current 3-semester BIO 100, botany, zoology series. Careful consideration has been given to the specific topics to be included to best prepare majors for advanced courses.</p>

Premedical and pre-dental students should have a firm foundation in basic concepts covered on the MCAT and DAT national exams. This outcome applies to both premedical biology majors and chemistry majors.	Practice MCAT exams are given yearly to premedical and pre-dental students who take our MCAT/DAT preparation course. The results of these practice tests can identify content areas that need improvement.	MCAT scores have not been at the level we would like in recent years. Pre-health advisors are analyzing recent score data to attempt to identify how course content and/or curriculum could be changed to improve scores.	The division has designated a pre-health advising committee composed of faculty who advise any pre-health students. One of the duties of this committee will be to study MCAT and other admission test data and make recommendations for changes in course content, curriculum structure, and advising methods aimed at improving scores.
Students in all majors should be able to analyze scientific data, develop hypotheses, interpret experimental results, draw conclusions, and present outcomes to an audience.	Selected chemistry and biology majors engage in internships, course-based field and laboratory projects, and present their results. Students involved in internships are generally required to submit a summary report of their projects. We encourage students to present research results at poster presentations of regional or national meetings of scientific societies.	Several students have attended scientific meetings with faculty to present posters or presentations. Evaluation by involved faculty members have critiqued student performance. Evaluation is done on an individual basis involving all faculty who have overseen the projects.	Division curriculum committee has been discussing how to involve more students in these kinds of activities. The recommendation is that we add to the curriculum a portfolio mechanism that will require all students in all majors to take part in a two-year process that will lead to individual studies and presentations to fellow students.
Students in the biology major will be able to understand and apply a cross section of concepts in their freshman year that will lead to adequate preparation of mid-level core courses and upper-level elective courses.	The division curriculum committee has collected data on the current structure of BIO 100, 102, and 103, the introductory courses with regard to concepts covered, order of presentation, and suitability for first-year biology majors. Syllabi of current courses have been compared and discussed.	Careful analysis of these courses has led biology faculty to question the length of time students should be required to spend on introductory concepts before advancing to mid-level core courses. Analysis indicated that the concepts covered in the present 3-semester curriculum could be redesigned as a 2-semester sequence. This would reduce duplication and enable students to advance to mid-level core courses more rapidly.	The curriculum committee has recommended that the division convert the current 3-semester introductory sequence to a 2-semester general biology sequence, merging the now separate botany and zoology courses into the general biology sequence. This change will begin in Fall 2007.

II. Division Goals for Current Year

Goal 1. Develop a plan for the renovation of the physical facilities of Caylor-White and Walters halls, emphasizing modernization of laboratory facilities, but also focussing on improved utilization of space and technology for state-of-the art instruction. Work on this goal began during 2005-2006 and continues during 2006-2007.

Institutional goal supported by this goal

The University is committed to excellence in its academic programs and is committed to student scholarship and student engagement. Supporting these commitments requires adequate and modern facilities. Representing the sciences, the division has a special responsibility to maintain classroom and laboratory facilities that provide the environment with scholarship and learning can be optimized.

Evaluation procedure

The science faculty, guided by our renovation team, have continued work with Architecture South and laboratory design consultants hired by them to evaluate and plan details of individual laboratories.

Use of evaluation results

Planning and evaluation to continue during 2007-2008. The basic layout of rooms in the proposed addition and renovations to the existing buildings have been completed. During 2007-2008 detailed planning of laboratory spaces is planned.

Goal 2. Provide adequate equipment, and resources so that students have the opportunity to develop research and technological skills required for success in their future employment or professional or graduate training. This goal continues from the past year.

Institutional goal supported by this goal

The division strives to maintain currency and appropriateness of its programs by adequately addressing basic skills, knowledge, and competencies. We are expected to optimize and improve the use of instructional technology. We are challenged to do more to encourage research and creative activities and to increase experiential learning components in our programs. This goal supports strategic plan goal #1: “enhanced academic programs will ensure that graduates are well prepared for successful careers and ready to contribute to the civic life of their communities?”

Evaluation procedure

We have identified which kinds of laboratory equipment are in the most critical need of replacement or upgrading. Examples include: Aging microscopes that need to be replaced in several biology laboratories. Aging equipment in chemistry laboratories need replacement The Wiley Planetarium is in need of upgrading of its main projection mechanism. Student access to computers for general use and Internet needs to be expanded.

Use of evaluation results

Evaluated needs will be enumerated and used to facilitate requests through granting agencies and other funding sources. Grant proposals will be aimed mainly at improvement of laboratory equipment and information technology facilities.

Goal 3. The division will work to continue to enhance the operations of the Center for Science and Environmental Education (CSEE) which provides both community service and university academic program components. The CSEE will work to meet the resource, professional

development, and other educational support needs of Delta school districts, science teachers, and their students and to provide for continuing science education experiences for the broader community. This is an ongoing goal that began with the establishment of the Center.

Institutional goal supported by this goal

Through its emphasis on development of a comprehensive support structure for pre-college science education in the Mississippi Delta, the CSEE is assisting the University in meeting these goals by establishing partnerships with many of these entities. This goal supports strategic plan goal #5: “the citizens of the region will benefit from increases in university outreach, service, and partnership initiatives.”

Evaluation procedure

The CSEE carefully tracks utilization of the programs and services that it offers. Questionnaires are used to collect information from individuals participating in CSEE programs and workshops. The feedback received from participating schools is used to guide future direction of CSEE

Use of evaluation results

The CSEE will continue efforts to provide pre-college teacher workshops designed to improve the skill of area teachers to provide appropriate science instruction.

The Center will continue its efforts to provide instructional units associated with the Great Explorations in Math and Science (GEMS) program. The CSEE is a national network training site for the GEMS program.

The CSEE’s facility in Merigold, MS will continue to be enhanced and serve as a resource center for area science teachers. The division will continue efforts to expand the impact of CSEE and its programming on stakeholders in the Delta through an emphasizing development of a mechanism to insure its sustainability into the future.

III. Division Data

Degree programs

Bachelor of Science with Major in Biology

General Biology Concentration

Pre-Medical Science Concentration

Biology Education Concentration

Bachelor of Science with Major in Chemistry

General Chemistry Concentration

American Chemical Society Certified Concentration

Pre-Medical Science Concentration

Chemistry/General Science Education Concentration

Bachelor of Science with Major in Environmental Science
General Environmental Science Concentration
Wildlife Management Concentration
Master of Science in Natural Science

Number of science majors (approximate): 300

Number of degrees awarded

Fall 2006, BS Biology	14
Fall 2006, BS Chemistry	2
Fall 2006, BS Environmental Science	2
Fall 2006, MSNS	4
Spring 2007, BS Biology	24
Spring 2007, BS Chemistry	9
Spring 2007, BS Environmental Science	1
Spring 2007, MSNS	3
Total for 2006-2007	59

IV. Personnel changes

- Dr. Jira Katembe was awarded tenure and promoted to Associate Professor of Biology.
- Dr. Jeff Duguay was awarded tenure and promoted to Associate Professor of Biology.
- Mr. Dinesh Talreja completed a one-year appointment for 2006-2007. He served as a temporary faculty member filling 2 vacated biology faculty positions while searches could be completed.
- Dr. Ellen Green has been hired as Assistant Professor of Biology. She will join the Division in Fall 2007. She fills the position vacated by Dr. Don Sudbrink. She will teach general biology, entomology, evolution and systematics, and advanced courses related to insects.
- Dr. Tanya McKinney has been hired as Assistant Professor of Biology. She will join the Division in Fall 2007. She fills the position vacated by Dr. Keith Hughes. She will teach general biology, microbiology, immunology, and advanced courses related to microbiology.
- Dr. Ernest Brothers resigned to take a new position out of state.
- Dr. John Tiftickjian has returned to full-time teaching, passing on the duties of Division Chair to Dr. Barry Campbell, who will serve as Interim Division Chair for the 2007-2008 academic year.

Activities and Accomplishments

- The Division's newest program, Environmental Science: Wildlife Management concentration has grown to 23 students.
- Dr. Barry Campbell maintained a community engagement component in General Zoology, focused on community-based mosquito control.
- Delivery of course materials via the Internet was improved in a number of courses, including those taught by Drs. Campbell, Duguay, Tiftickjian, Katembe, Kobayashi, Baghai-Riding, and Bentley.
- Students in Dr. Campbell's Parasitology class were able to conduct the service-learning component of the course using materials purchased through funding received from the Mississippi Higher Education Consortium (administered by the Center for Community and Civic Engagement at the University of Southern Mississippi) These students screened animals up for adoption at the Cleveland Bolivar County Animal Shelter for parasites and reported the results of their findings to the animal shelter director.
- Dr. Campbell taught Comparative Vertebrate Anatomy in Fall, 2006, the first time in 3 years that the course had been taught. He developed digital materials for this class.
- Dr. Campbell, created podcasts of his lectures in Histology to provide students with an additional learning resource. This is the first course at DSU to include a podcast.
- Dr. Campbell's Medical & Veterinary Entomology includes a service-learning project which continues to build a website that provides residents of the Delta region with information about local mosquitoes and mosquito-borne diseases.
- Dr. Campbell is writing a chapter on capillariasis on the revision of Parasitic and Infectious Diseases of Wild Birds, a standard text widely-regarded among avian disease workers.
- Dr. Smithhart developed new laboratory experiments using the new NMR instrument for his course in Instrumental Analysis.
- Dr. Smithhart developed an Excel spreadsheet to enhance graphing. exercised in General Chemistry Laboratory.
- Dr. Smithhart attended a week-long summer NSF Environmental Chemistry Workshop at Hampton University in Hampton, VA
- Dr. Smithhart and Dr. Kobayashi collaborated to determine a feasible analytical screening method for DDT/DDE surveys in area fish.
- Dr. Smithery planned a study of the x-ray mineralogy of Colorado mine tailings is expected to begin in Fall 2007 if an interested student researcher is found.
- Dr. Smithhart served as Chairman of the Faculty Research Committee and Coordinator for the Research and Scholarship Symposium
- Dr. Blackwell developed inquiry based field studies and integrated technology (LabPro monitoring equipment, GPS receivers) into Ecology laboratory activities.
- Drs. McEwen and Blackwell co-authored: *Facilities Associated With the Biology Education and Chemistry Education Programs at Delta State University, Mississippi Environmental Education Alliance, March 24, 2007.*
- Dr. Blackwell continued to improve the building and grounds for the Center for Science and Environmental Education facility in Merigold including: initiating a grounds beautification program, building a climbing plant fence for viewing different attachment methods, installing a solar powered weather station display, installing an organic fertilize (compost) display, planting native wildflowers, trees, and vines species,

setting up houses and feeders to attract birds for viewing, and placing bat boxes to attract bats and educate students about their benefits (feeds on mosquitoes).

- Dr. Duguay developed a service learning component to his Wildlife Techniques course. Students worked with the manager and biologist at Dahomey National Wildlife Refuge sampling plant and animal populations.
- Dr. Duguay presented: *Diurnal microhabitat use by American woodcock wintering in East Texas* at the Tenth American Woodcock Symposium.
- Dr. Duguay authored: *Habitat use and population ecology of American alligators in inland wetlands of east Texas*, in review for the Journal of Wildlife Management.
- Dr. Duguay has studied the Marbled Salamander Habitat Use at Dahomey NWR.
- Dr Duguay has studied Impacts of Deer Overabundance on Invertebrate Communities in a Suburban Environment. Anticipated publication after the summer 2007 field season.
- Dr. Duguay attended Waterfowl Workshop on Delta Duck Populations and Habitat, Sponsored by Delta Wildlife, 27 February 2007
- Dr. Duguay received Service Learning Faculty Fellowship from Mississippi Higher Education Consortium - \$2,000.
- Dr. Duguay chaired the Dean Spradling Environmental Science Symposium committee.
- Dr. Duguay serves as Executive Board Member, Mississippi Chapter of The Wildlife Society
- Dr. Duguay helped organize The Wildlife Society, a new student organization at DSU.
- Dr. Duguay served as a committee member for the Mississippi State University Extension Service and Bolivar County Soil & Water Conservation District 4-H “After the Hunt” Wildlife Jamboree January 2007
- Dr. Duguay was interviewed on the *Good Morning Mississippi* television program concerning the Wildlife Management concentration at DSU.
- Dr. Katembe is developing research projects to be carried out with the Li-COR Model 43000L DNA analyzer, obtained through a matching fund grant which are designed to give students valuable skills in handling this modern equipment. The projects will involve sequencing of cloned DNA and determining the family structure of catfish at a local pond through genotyping using special molecular markers.
- Dr. Katembe published: *Plant Biotechnology: Current and Future Applications of Genetically Modified Crops, Immunology in Plant Health and its Impact on Food Safety*, and *Hormones, Signals and Target Cells in Plant Development* in Plant Science Bulletin.
- Dr. Bentley presented: COMPARISON OF ¹³C-NMR CHEMICAL SHIFTS WITH QUANTUM CALCULATIONS at the Seventy-First Annual Meeting of the Mississippi Academy of Sciences
- Dr. Steele has initiated a coordinated tutorial program for students in general chemistry
- Dr. Steele has been involved in an analytical research project with USDA-ARS at Poplarville, MS to develop reproducible procedures to monitor selective metal uptake into the roots, trunk, stems, and leaves of Highland blueberries funded by USDA-ARS and NASA (Mississippi Space Grant),

- Dr. Steele has been involved in a preliminary research project with Kevin Baioni (DSU, 1990) of Ciba to develop procedures to monitor quality of biodiesel from soybean and cottonseed oil.
- Dr. Steele has been involved in an analytical research project with USDA-ARS at Stoneville, MS to develop reproducible procedures to extract aflatoxins from corn and peanuts funded by USDA-ARS and NASA (Mississippi Space Grant),
- Dr. Steele presented: *Inspiration Through Chemical Education*, J. Miss. Acad. Sci., 52 (2007)
- Dr. Baghai-Riding attended several botanical workshops at the August 2006 Botanical Society of America conference in Chico, California. Information gained through these workshops will improve illustration methods in both research and teaching activities.
- Dr. Baghai-Riding attended a Chautauqua course *The Missoula Floods-Source to Sea*.
- Dr. Baghai-Riding attended a 4-H volunteer workshop on March 3, 2007 on GPS, GIS, and wildlife exercises.
- Dr. Baghai-Riding received a Bryce Griffis grant to do a palynological survey of Winterville Mounds concerning the local ecological and geomorphic settings from A.D. 1000 to 1650 and food sources that were available to Native Americans during that period.
- Dr. Baghai-Riding received research funding from the UDSA to study palynomorphs from four archeological soil samples in northern Mississippi.
- Dr. Baghai-Riding received a Delta State University Foundation Excellence in Research award (February 2007)
- Dr. Baghai-Riding presented: *A palynological investigation of the McNairy Sand Member in northern Mississippi*, at the DSU research scholarship symposium.
- Dr. Baghai-Riding presented: *Japanese knotweed and other palynological inferences from soil cores in the Woonasquatucket River Valley, Rhode Island*, at the Botanical Society of America Scientific Meeting.
- Dr. Baghai-Riding presented: *Palynological implications from soil cores in the Woonasquatucket River Valley, Rhode Island*, U.S. Army Corps of Engineers (USACE) Infrastructure Systems Conference (ISC), Detroit, Michigan.
- Dr. Baghai-Riding has begun reorganizing the DSU herbarium collection.
- Dr. Baghai-Riding organized an ice-age fossil display for the DSU Natural History Museum. This display was completed in October 2006. This display also helped CSEE acquire the 2nd Congressional District Community Pride Award for 2006.
- Dr. Baghai-Riding received the Second Congressional District II award for participation in a Community Pride Grant.
- Dr. Baghai-Riding received a \$400 Community Pride Grant from 4-H and Chevron.
- Dr. Baghai-Riding received a \$200 grant through the United-Way in Cleveland, Mississippi to help with Emergency Preparedness.
- Dr. Baghai-Riding conducted two 4-H field trips and one workshop involving construction of invertebrate and vertebrate fossil kits from northern Mississippi and southern Tennessee.
- Dr. Baghai-Riding presented exhibits and displays at the Memphis, Tennessee Mineral, Fossil, and Jewelry Show
- Dr. Baghai-Riding served as academic faculty sponsor of the Water Environmental Federation Student Chapter.

- Dr. Baghai-Riding served as a mentor for Scientific Inquiry through Plants, affiliated with the Botanical Society of America.
- Seven faculty and 10 students were involved in undergraduate research activities provided by Mississippi Space Grant Program.
- Several faculty have served as reviewers of scientific textbooks and other scientific publications.

V. Degree Program/Curriculum Changes

- Replaced the 3-semester freshman biology course sequence (Principles of Biology, Botany, Zoology) with a 2-semester sequence, Principles of Biology I and II (BIO 100, 101).
- Removed the Plant Science and Industrial Biology concentrations from the BS Biology major.
- Added courses: BIO 101, Principles of Biology II; BIO 330, Mammalian Physiology I; BIO 331, Mammalian Physiology II; BIO 426, Reproduction; and BIO 428, Endocrinology.

VI. Division Goals for 2007-2008

Goal 1. Continue development of the plan for the renovation of the physical facilities of Caylor-White and Walters halls, emphasizing modernization of laboratory facilities, but also focussing on improved utilization of space and technology for state-of-the art instruction. Work on this goal began during 2005-2006 and will continue through 2007-2008

Institutional goal supported by this goal

The University is committed to excellence in its academic programs and is committed to student scholarship and student engagement. Supporting these commitments requires adequate and modern facilities. Representing the sciences, the division has a special responsibility to maintain classroom and laboratory facilities that provide the environment with scholarship and learning can be optimized.

Evaluation procedure

The science faculty, guided by our renovation team, will continue work with Architecture South and laboratory design consultants hired by them to evaluate and plan details of individual laboratories. Planning is ongoing. The overall plan for an addition to the building and reallocation of space in the existing building has been done. Several meetings are planned with individual faculty, Architecture South, and laboratory consultants. The current goal of designing individual laboratories and research spaces will be completed by Fall 2007.

Use of evaluation results

The science faculty will work on individual laboratory rooms which each is responsible for and then collaborate working toward the most efficient use of space with the good of the entire division in mind.

Goal 2. Provide adequate equipment, and resources so that students have the opportunity to develop research and technological skills required for success in their future employment or professional or graduate training. This goal continues from the past year.

Institutional goal supported by this goal

The division strives to maintain currency and appropriateness of its programs by adequately addressing basic skills, knowledge, and competencies. We are expected to optimize and improve the use of instructional technology. We are challenged to do more to encourage research and creative activities and to increase experiential learning components in our programs. This goal supports strategic plan goal #1: “enhanced academic programs will ensure that graduates are well prepared for successful careers and ready to contribute to the civic life of their

communities?

Evaluation procedure

Science faculty are evaluating equipment and resources in their own teaching areas in conjunction with the design of upgraded laboratories for the building renovation project. Records of equipment needs are being constructed.

Use of evaluation results

As we identify the kinds of equipment that are in the most critical need of replacement or upgrading, we will initiate requests through the university as well as through granting agencies and other funding sources.

Goal 3. The division will work to continue to enhance the operations of the Center for Science and Environmental Education (CSEE) which provides both community service and university academic program components. The CSEE will work to meet the resource, professional development, and other educational support needs of Delta school districts, science teachers, and their students and to provide for continuing science education experiences for the broader community. This is an ongoing goal that began with the establishment of the Center.

Institutional goal supported by this goal

The University has identified as one of its goals to “strengthen the cooperative relationships with business, industry, community groups, government, and other educational institutions.” Through its emphasis on development of a comprehensive support structure for pre-college science education in the Mississippi Delta, the CSEE is assisting the University in meeting these goals by establishing partnerships with many of these entities. This goal supports strategic plan goal #5: “the citizens of the region will benefit from increases in university outreach, service, and partnership initiatives.”

Evaluation procedure

The CSEE will carefully track utilization of the programs and services that it offers during the coming academic year. Questionnaires will be used to collect information from individuals participating in CSEE programs and workshops.

Expected results

We expect the feedback received from participating schools to guide future direction of CSEE

Results of evaluation

The CSEE will continue efforts to provide pre-college teacher workshops designed to improve the skill of area teachers to provide appropriate science instruction.

The Center will continue its efforts to provide instructional units associated with the Great Explorations in Math and Science (GEMS) program. The CSEE is a national network training site for the GEMS program.

The CSEE’s facility in Merigold, MS will continue to be enhanced and serve as a resource center for area science teachers. The division will

continue efforts to expand the impact of CSEE and its programming on stakeholders in the Delta through an emphasizing development of a mechanism to insure its sustainability into the future.

Goal 4. The Division will revise its committee structure to better distribute the activities of the division to all the faculty and provide better communication between its faculty and students concerning the goals and responsibilities of the division.

Institutional goal supported by this goal

This goal supports strategic plan goal #3: “the university community will benefit from better communication, effective operational and administrative systems, an optimal work environment, and a performance-responsive reward structure.”

Evaluation procedure

The division committee structure will be formalized to include committees on: Scholarships and Awards, Budget, Safety and Security, Educational Technology, Curriculum, and Renovation. Committee members will be appointed by the Chair and will meet regularly, recording their activities and recommendations. These records will be evaluated by the Division faculty as a whole.

Results of evaluation

The faculty will discuss all committee recommendations with the goal of improvement of the Division as a whole. Recommendations of the committees will be approved or disapproved by the faculty. Approved recommendations will be acted upon within the division or forwarded to the appropriate university administration offices as required.

NOTE: With the end of the 2006-2007 academic year, the Division leadership has changed with Dr. Tiftickjian returning to full-time teaching and Dr. Barry Campbell being appointed to Interim Chair. It should be recognized the under this new leadership, the Division’s goals will be modified. The Division, through its new Chair, will keep the University informed of changes to its goals though communication with the Dean of the College of Arts and Sciences.