COVER PAGE FOR TRADITIONAL AND UNDERGRADUATE ENHANCEMENT PROPOSALS
BOARD OF REGENTS SUPPORT FUND, FY 2007-08

ORIGINAL

018CHE-08

1. This Proposal Involves: __X__ One Institution ____More Than One Institution	2. Enhancement Subprogram: (check one) __X__ **TRADITIONAL** ENH Program (Includes all multidisciplinary proposals) ____ **UNDERGRADUATE** ENH Program
3. This Proposal Is: (check one) _X_ Primarily an Equipment Request	___ Not Primarily an Equipment Request
4. Name(s) of Submitting Institution(s) of Higher Education (Include Branch/Campus/Other Components)	Nicholls State University
5. Address of Institution of Higher Education (Include Dept/Unit, Street Address/P.O. Box Number, City, State, Zip Code)	Department of Physical Sciences P.O. Box 2022 Thibodaux, LA 70310
6. Title of Proposed Project	C:SI-REAL (Chemistry: Stimulating Interest through Relevant Experiences in the Analytical Laboratory)

7. First-Year Support Fund Money Requested	8. Second-Year Support Fund Money Requested (if applicable)	9. Proposed Duration (Circle # of Yrs.)
$ 25,000	$	(1) 2

10. Category In Which Proposal Is Being Submitted (check one only)	11. Using the Taxonomy in Appendix A of the RFP, Identify All Specific Subcategories of the General Category That Apply to This Proposal and Provide Taxonomy Numbers:
__ **BUSINESS** __ **MATHEMATICS** _X_ **CHEMISTRY** __ **PHYSICS/ASTRONOMY** __ **EDUCATION** __ **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.)**	Subcategory(ies): Analytical Chemistry Taxonomy Number(s): 0302

12. This Proposal Is a: _X___ New Request ____ Request for Continuation of a Previously-Funded Support Fund Project (check one) Provide 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) Grants for Research and Education in Science and Engineering, NSF Grant Proposals Guide (GPG), NSF 03-2, effective 10/1/02, and (b) 45CFR 620, Subpart F (Requirements for a Drug-Free Workplace).

Name/Title/email (type or print) Institution (if different from Item #5 above)	Dept./Telephone No.	Degree/Year	Signature
PI/PD April Dupre	Physical Sciences/ 985-448-4503	M.S. /2003	April Dupre
Co-PI/PD			
Co-PI/PD			
Co-PI/PD			
Co-PI/PD			

Campus Head or Authorized Institutional Representative	**Dean**	**Authorized Fiscal Agent**
Name/Title/email: (type or print) Ms. Debbi Benoit Director, Office of Research and Sponsored Programs Debi.Benoit@nicholls.edu	Name/Title/email: (type or print) Dr. Badiollah Asrabadi Dean, College of Arts and Sciences B.Asrabadi@nicholls.edu	Name/Title/email: (type or print) Lionel O. Naquin V.P. for Finance and Administration Lionel.Naquin@nicholls.edu
Signature: Debbi Benoit	Signature: B.R. Asrabadi	Signature: Lionel Naquin
Date: 10/19/07 Telephone Number: 985-448-2563	Date: 10/17/07 Telephone Number: 985-448-4385	Date: 10/18/07 Telephone Number: 985-448-4016

(Form 1-ENH, Rev. 2007)

PROJECT SUMMARY

Name of Institution (Include Branch/Campus and School or Division)

Nicholls State University

Address (Include Department)

Department of Physical Sciences
906 East 1st St
P.O. Box 2022
Thibodaux, LA 70310

Principal Investigator(s)

April Dupre

Title of Project

C:SI-REAL (Chemistry: Stimulating Interest through Relevant Experiences in the Analytical Laboratory)

Abstract (DO NOT EXCEED 250 WORDS)*

Separation science is a critical area in analytical chemistry as few samples are pure when submitted for analysis. In chromatographic separations, mobile phase (MP) travels through a fixed stationary phase (SP). Separation is achieved by exploiting intermolecular interactions between sample mixture components, dissolved in the MP, and SP surface groups causing spatial separation (mixture components exit the SP at different times because of these interactions). Liquid chromatography (LC) is the most versatile chromatographic method as its only requirement is solubility in some liquid solvent; consequently, there is little, if any, need for chemical modification/derivatization of the sample. High Performance Liquid Chromatography (HPLC) is distinguished from LC by the SP particles: HPLC utilizes small, uniform, spherical SP particles (3-5 μm in diameter), resulting in much greater separation efficiency and shorter analysis times due to the increase in SP surface area (number of interaction sites), and requiring the application of high pressure ($10^3 - 10^4$ psi) to move the MP (and sample) through the SP. HPLC, because of its diversity and reproducibility, is presently the most commonly used separation method. HPLC is used in applications in a variety of industries: pharmaceutics, environmental science, food, agriculture, forensics, proteomics, polymer analysis, and art, to name a few. Experience in analyzing "real world" samples using a modern HPLC instrument and method(s) would be relevant and beneficial to all students enrolled in the quantitative analysis lab and vitally important to the students taking instrumental analysis lab, the two analytical laboratories in chemistry's core curriculum.

(Form 2, rev.2007)

CHEMISTRY: STIMULATING INTEREST THROUGH RELEVANT EXPEREINCES IN THE ANALYTICAL LABORATORY (C:SI-REAL)

4. PROJECT NARRATIVE AND BIBLIOGRAPHY

Chemistry: Stimulating Interest through Relevant Experiences in the Analytical Laboratory (C:SI-REAL)

a. The Current Situation. (10 points)

a.1 Institutional Description (no points)

Nicholls State University, located in Thibodaux, Louisiana, is a comprehensive, regional 4-year institution of higher learning and serves citizens primarily from southern Louisiana. Nicholls has a student body, at present, of approximately 6900 students of which 90% are undergraduate students and 10% are graduate students. Nicholls is mainly a commuter college and has an undergraduate non-traditional student population of more than 1400 students. The entire student population may be described as about 65% female, 23% minority (16% African American), and close to 80% are the first generation in their family to attend college.

The Department of Physical Sciences offers courses in chemistry, geology, physical science and physics and is located in Beauregard Hall, with laboratory courses in chemistry being taught in Beauregard and Peltier Halls. The only degree-granting program of the department is chemistry, which offers an ACS-approved B.S. degree. The department is composed of 11 full-time faculty members: 8 chemists, 2 geologists, and 1 physicist. The chemistry faculty members have the following make-up: 6 PhDs, 1 MS, and 1 ABD; 2 associate professors, 3 assistant professors, and 3 instructors; 3 organic chemists, 2 analytical chemists, 1 physical chemist, 1 inorganic chemist, and 1 biochemist. Roughly 7.5% of the Nicholls student body is majoring in some concentration area of chemistry (professional or pre-medicine/dentistry) or biology (microbiology, pre-medicine/dentistry, environmental, general, marine, pre-occupational/physical therapy, pre-medical technology, biotechnology, or pre-veterinary medicine) and must earn at least 20 hours of college chemistry with at least 5 of these hours being laboratory courses. On average, Nicholls graduates 7chemistry majors per year. This number is expected to increase as 29 students in the incoming freshman class declared chemistry as their major.

a.2 Rationale for Project (5 points)

Nicholls State University is currently undergoing numerous improvements, and a complete renovation of Beauregard Hall into a first-rate science building will begin in May of 2008. Upon completion, all chemistry laboratories (both instructional and research) will thereafter be housed exclusively in Beauregard Hall. This proposal seeks to purchase a newer, more modern HPLC than the instrument we currently possess in keeping with the following criterion of the ACS Committee on Professional Training (CPT): "It should give students hands-on experience with chemistry and the self-confidence and competence to use and understand modern instruments, particularly NMR, FT-IR and UV-vis spectrometers; GC, GC-MS, and ***HPLC*** instruments for chemical separations; and electrochemical instruments[1]." Nicholls currently possesses an obsolete HPLC instrument that is more than 10 years old: Hewlett Packard Series 1050 HPLC, which "officially went out of support July 31, 2006, after 10 years of support[2]." It is not in use

presently because the instrument integrator, the only means to extract data output on the instrument, is out of service. But even when the instrument is functional, it isn't equipped with a component that nearly all more current instrument models (which students will be expected to operate in industrial jobs or graduate studies) possess:

1. An instrument data station which provides the following capabilities:
   a. An interactive user interface to control instrument operational parameters such as solvent flow rate, solvent composition, and detection wavelength
   b. A desktop PC (that is networked to the instrument hardware) with proprietary chromatographic software installed on it that allows users to graphically visualize, manipulate, and analyze data output in a variety of manners that are not possible on the instrument Nicholls currently possesses.

Although not the only benefit gained from a new instrument, it, along with technical support for instrument troubleshooting, are some of the most critical aspects on the list.

a.3 Impact on Existing Resources (5 points)

The current trend in chemical analyses is the hybridization of instrumental methods (i.e., analyzing samples using two or more instruments), sequentially to add an additional dimension in chemical analyses in order to glean additional and complementary information about the nature and/or possibly even the identity of the chemical species present in an unknown sample. LC plays a vital role as it serves dual purposes in this endeavor: it is the first dimension of the analysis as well as a means of sample purification prior to the second dimension of the analysis. Consequently, LC has been coupled to Fourier transform infrared (FT-IR) spectrometers, nuclear magnetic resonance (NMR) spectrometers and mass spectrometers to provide valuable structural and/or molecular weight information about the sample[3-5]. Not surprisingly, LC has applications in nearly all biological and chemical, as well as many "non-science", industries in which samples must be analyzed to determine physicochemical properties or molecular identification[6-17]. LC-NMR, in particular, is gaining popularity due to its unparalleled ability to provide explicit structural, not just functional group, information[18,19]. The department currently has both a 200 MHz Bruker Avance NMR as well as a Mattson FT-IR spectrometer on which fractions, collected from HPLC sample runs, can then be analyzed to provide valuable, complementary structural information for positive sample identification, which cannot be obtained through chromatography alone.

b. THE ENHANCEMENT PLAN

b.1 Project Goals and Objectives (5 points for both equipment and non-equipment proposals)

Goal

- The goal of this project is to stimulate student interest and enhance the overall educational experience of students, specifically science majors, in analytical chemistry laboratory courses (Chemistry 302 and 407) at Nicholls State University through the purchase and use of the proposed piece of equipment.

Objectives

- To provide relevant and current instruction and experience on modern instrumentation

  Because the HPLC Nicholls currently possesses is more than 10 years old, it is very unlikely that students will ever encounter an instrument with its same specifications on which they will perform chemical analyses. The intent of the PI is to poll local industrial contacts and academicians to determine which chemical separations, with respect to the nature/composition of the sample as well as the chromatographic method used (buffers used, MP gradient conditions, analysis times, wavelength detected), are most commonly performed to aid in experiment selection.

- To better prepare students for either employment in industry and/or graduate studies upon completion of the B.S. degree

  Using information gathered from current literature[20-22], from industrial contacts[23] (personal communication included in Appendix A), from searching the websites of M.S. and Ph.D. graduate programs, and from the PI's own experience in graduate studies, it is obvious that LC, particularly HPLC, is used extensively in all arenas. Therefore, student familiarity with this analytical method would be beneficial and helpful, regardless of the career path taken.

- To aid student comprehension of pertinent theoretical information so that critical problem-solving, troubleshooting, and method development skills are developed

  The function of all laboratory coursework in chemistry is to serve as a tangible, hands complement to the abstract concepts presented in the lecture hall[1]. These skills are of utmost import in both industrial employment and graduate studies.

- To provide experience in technology-oriented data collection and analysis

  Most modern instruments utilized in industry and academics have computer-driven user interfaces that allow the user to specify such experimental parameters as analysis time, physical quantity measured, region of interest/detection window, and rate of change of independent variable (solvent composition/ temperature/pressure/electric field), to name a few. Furthermore, current HPLC instruments are most often outfitted with data stations, consisting of hardware to interface the instrument to a PC (and printer) as well as proprietary software that

allows the user to electronically analyze chromatographic data and instantaneously (or very easily) obtain any number of analytical figures of merit that allow the user to make real time (or nearly so) assessments of the effect of changes in experimental variables and/or whether additional/alternative measurements or changes in experimental conditions/parameters are warranted. While the instrument currently in use has an electronic user interface, an integrator, that provides only a hard copy of the sample chromatogram, is the only means of obtaining data output. This printout must then be analyzed by hand, thus introducing an additional source of experimental error and requiring longer (data) analysis times. Even though a student may use a different "brand" of instrument in future work and its software will not be identical to that provided and used with the purchased instrument, most vendors' software has similar functions and capabilities. Hence, acquaintance with these features, at the level required in the analytical laboratories, should be sufficient for all career purposes.

b.2 Work Plan of Proposed Project (equipment proposals =15 points; non-equipment proposals = 20 points)

Timeline

Note: *The project PI will be responsible for all duties involved in the execution of this proposal.*

- Summer 2008 – Early Fall 2008:
    1. Procure and set up equipment purchased.
- Fall 2008:
    2. Perform test experiments to validate instrument is fully operational and column is viable.
    3. Test candidates for possible undergraduate laboratory experiments and select those that are the best in terms of ruggedness and relevance.
- Winter 2008
    4. Develop instructional materials for instrument usage in the instrumental analysis laboratory (lab manual materials, notes, lecture presentations, student assignments, lab report requirements, etc.).
- Spring 2009
    5. Utilize instrument in the instrumental analysis laboratory, Chemistry 407.
    6. Identify and address problem areas prior to incorporation into the quantitative analysis laboratory schedule of experiments or any other course.

Assessment

- Sample chromatographic data obtained during the test experiments will serve as evidence that tasks 1and 2 in the timeline have been completed.
- Copies of instructional materials and experimental data will illustrate the completion of tasks 3 and 4.
- Samples of student work in the instrumental analysis laboratory course, in the form of lab reports, will be compiled and used as a method of evaluation for task 5. Success will be measured in the ability of students to demonstrate insight into the chemical principles governing chromatography and communicate this understanding verbally in the discussion and conclusion sections of the lab reports.
- Finally, the PI (and instructor of the instructor of the instrumental analysis laboratory during the grant period) and student users will maintain a log of instrument use during the course of the grant period and record any anomalous or extraordinary occurrences during use, how the event was addressed (clearly indicating success or failure), and the final outcome of the event. A copy of this log will be provided as evidence for task 6.

b.3 Evidence of Potential to Achieve Recognized Eminence at the Regional, National, or International Level Commensurate with Degree Offerings and/or Functions (equipment proposals = 20 points; non-equipment proposals = 25 points)

Chemistry achieved the distinction of becoming an ACS-approved degree program as determined by American Chemical Society Committee on Professional Training (ACS-CPT) in 2003. To the PI's knowledge all, or nearly all, chemistry graduates attain job placement upon receipt of the B.S. degree. Most graduates are employed in the chemical industry. Chemists in Louisiana have an average salary of $55000, 64% higher than the state average. The chemical industry in Louisiana is vital to it provided income in some way to roughly 5% of the state's population in 2005.[24] A Chemistry Advisory Council (CAC), composed of alumni who hold high-profile positions in local companies, serves as a valuable resource for both students (in the form of networking) and faculty (particularly as a source of information). The PI intends to keep in close contact with CAC members and other industrial personnel for the purposes of monitoring Nicholls graduates' skills and abilities in relationship to other entry-level B.S. chemists and as a source of relevance and currency for future experiments planned, developed, and performed on the funded equipment. Nicholls graduates routinely enter employment and achieve prestigious positions at local chemical plants and should continue to do so with the added experience gained through work on the proposed instrument.

Research figures prominently in Nicholls' chemistry curriculum. The department offers courses entitled Research Problems (Chemistry 451 and 452) as electives for students who wish to earn credit by performing research under supervision of the faculty member their choice as There is also a course (Chemistry 480) for which students can earn credit for paid industrial or academic (NSF-REU) internships, for which our junior majors have been very successful in competing in previous summers. If funded, the proposed HPLC will only bolster these metrics

by providing an additional instrument on which to perform research in Chem 451 and 452 and providing additional experimental experience for students vying for academic or industrial internships.

In recent years, about one-third of our graduates have been accepted to Ph.D. programs at major universities. A modern HPLC on which to perform standard undergraduate chemical separations will serve to enhance students' education in analytical chemistry, which they may be required to retain and apply in partial fulfillment of core coursework requirements at their selected graduate institution. It will also expose students to a new instrumental technique. Students are required to take a course in chemical literature (Chemistry 319) in which they explore current literature in areas of interest of their choice. Because HPLC instruments are utilized prevalently in almost all chemistry disciplines and fields, it is very likely that a student may find literature detailing experiments that he/she wishes to attempt in Chem 451 or 452, the outcome of which may be communicated in the form of manuscripts in peer-reviewed journals (*J. Chem. Ed., J. Chrom. A or B, J. Sep. Sci., etc.)* or presentations at regional and/or national scientific meetings (Louisiana Academy of Sciences, PittCon, local and national ACS section meetings, etc.) and will likely increase his/her chances of being successful on his/her chosen career path. While student research will not be the primary use of the equipment, the instrument will not be in use for more than 4 hours Monday through Thursday, and there should be ample opportunity for students (and even faculty members) to use it for research purposes.

b.4 Impact on Curriculum and Instruction (5 points)

Two of the primary objectives of the equipment sought in the grant are to aid student comprehension of pertinent theoretical information so that critical problem-solving, troubleshooting, and method development skills are developed and to provide relevant and current instruction and experience on modern instrumentation: two mandates that figure prominently in the ACS-CPT's *Undergraduate Professional Education in Chemistry Guidelines and Procedure.*[1]. Pedagogy will be focus on two specific aims in achieving these objectives: building a strong foundation based on the fundamental chemical principles governing separations and applying this knowledge to the deeper, more challenging issues that arise when analyzing more complex, real world samples. In order to reinforce the scientific principles that govern chromatography, separations that are routinely performed in undergraduate laboratories will be selected for chemistry 302 and 407, initially[25,26]. Seniors enrolled in the instrumental analysis course will then be called upon to apply knowledge previously presented in the lecture course in two fashions: they will predict the outcome of the modification of experimental parameters dictated by the instructor and they will propose new experimental parameters in order to gain a more optimum separation (as determined by calculation of one or more pre-determined figures of analytical merit from resultant data).

b.5 Impact on Quality of Students (2 points)

The proposed project will enhance the ability of the department to attract and retain stronger students:

- Recruiting
  - Nicholls hosts the annual Louisiana Region I tournament of the Science Olympiad, composed of a junior and a senior division, with eligible students enrolled in grades 6 to 12. These students get a firsthand view of Nicholls' facilities and instruments 4-6 years before they enter college. Seeing modern, state-of-the-art instruments will serve as an incentive to consider the university for their undergraduate studies.
  - In the past, Nicholls has also collaborated with local high school teachers to provide assistance with both research and science fair projects. The HPLC would provide an additional analytical method at the high school community's disposal, giving a diverse population of students the ability to be exposed to and become familiar with the department. At least 3 of the 49 chemistry majors at Nicholls participated in similar activities while they were high school students. It is the intent of the PI to re-establish this source of community outreach in the future.
- Retention.
  - Interest in the subject and success in coursework are major factors in retaining students. The accessibility of modern instruments and the completion of experiments that the students can "relate to"[25] are crucial to student retention as they stimulate interest and complement lecture coursework for hands-on learners. Added to this is the personalized attention that Nicholls can offer due to its lower teacher:student ratio.

Because HPLC is such a common analytical method and many industrial and academic labs seek individuals with practical experience using the instrument, it will also help to produce stronger, more marketable graduates who will have greater success in whatever career they choose to pursue, barring unforeseen circumstances.

b.6 Impact on Faculty Development (5 points)

This project will provide a means for greater interaction among faculty members, both within the department and university-wide. Because HPLC has applications across all of chemistry's disciplines, the instrument could have implications in several additional laboratory courses offered in the chemistry curriculum, time permitting. Also, few faculty members in the department are actively engaging in research involving wet chemistry at the present moment. This instrument could be used as a springboard to jump-start new scholarly research projects as well as to perform complementary analyses for any of the ongoing theoretical and/or computer-oriented research in the department. It could also potentially be used in interdisciplinary work, particularly in collaborations with faculty in the Department of Biological Sciences for research

they are doing. These are but a few of the numerous possibilities for faculty development that the instrument would provide.

b.7 Performance Measures (0 points)

Copies of the materials outlined in the assessment section of the work plan (sample data, instructor's teaching materials, student lab reports) will be to the Board of Regents in both paper and electronic media. Additionally letters from other persons (i.e. industrial personnel, high school teachers, university colleagues) who have benefitted from the instrument will be solicited and provided.

c. EQUIPMENT

c.1 Equipment Request (6 points)

This proposal seeks to purchase a newer, more modern HPLC than the instrument we have at present. Nicholls currently possesses an obsolete Hewlett Packard Series 1050 HPLC instrument that is more than 10 years old, which "officially went out of support July 31, 2006, after 10 years of support[2]." It is not in working order, presently, because the instrument integrator, the means to extract data from the instrument, is out of service. But, even when functional, the instrument is still outdated as it isn't equipped with a component that nearly all more current instrument models (which students will be expected to operate in industrial jobs or graduate studies) possess:

- An instrument data station which provides the following capabilities:

    1. An interactive user interface to control instrument operational parameters such as solvent flow rate, solvent composition, and detection wavelength
    2. A desktop PC (that is networked to the instrument hardware) with proprietary chromatographic software installed on it that allows users to graphically visualize, manipulate, and analyze data output in a variety of manners that are not possible on the instrument Nicholls currently possesses.

Although these are not the only benefits gained from a new instrument, they, along with technical support for instrument troubleshooting, are some of the most critical aspects on the list.

c.2 Equipment on Hand for Project (1 point)

Our university possesses many stand-alone PCs on which additional methods for data analysis and reduction may be performed. The data station and instrument software will allow students to obtain their experimental data in ascii format to be analyzed with other spreadsheet software (such as Excel, Quattro Pro, Origin, SigmaPlot, to name a few), if necessary. In fact the PI is serving as the co-PI of a pending undergraduate LEQSF proposal entitled "Modernization of Computer Facilities for Chemistry Instruction" that seeks to provide such PCs in the chemistry department for use in the Quantitative Analysis laboratory with her primary duties entailing "coordinating the scheduling of computer use with other instructors" of this and other courses specified in the proposal and "maintaining a utilization log."

c.3 Equipment Housing and Maintenance (3 points)

The requested equipment will initially be housed in the instrumental analysis laboratory, located in Peltier Hall, while renovations are made in Beauregard Hall. Instrument assembly and PI training is typically provided with instrument purchase. Upon completion of the Beauregard Hall renovations, the instrument will be relocated to the instrumental analysis laboratory in the new building. It will be the responsibility of the PI and other non-student users to provide any needed materials for as well as to perform all necessary customary and preventive maintenance stipulated in the instrument manual and experimental SOPs. The PI has access to several academic and industrial resources, made through contacts that she initiated as an undergraduate and in graduate school, who would provide technical expertise should the need arise.

d. FACULTY AND STAFF EXPERTISE [total point value = 12]

The faculty serving as principal investigator on this project possesses the expertise and knowledge to successfully undertake and complete this enhancement project.

PI: April L. Dupre, M.S. and Ph.D. candidate in bioanalytical chemistry, (Instructor of Chemistry), is an analytical chemist whose doctoral research hinges on chemical separations. She is actively conducting research using capillary electrophoresis (CE), a "sister" separation technique as compared to HPLC. She has taught undergraduate analytical laboratory and lecture courses at the TA and instructor levels. She has also completed the core undergraduate anlalytical chemistry coursework at Nicholls State University and both an introductory and an advanced graduate course in chemical separations at the University of Cincinnati. She in contact with former colleagues and mentors who may be used to provide technical assistance with instrument issues as well as guidance, advice, and informational resources on teaching pedagogy.

e. ECONOMIC AND/OR CULTURAL DEVELOPMENT AND IMPACT [total point value = 12]

e.1 Relationships With Industrial/Institutional Sponsors (2 points)

This project will strengthen the existing relationship between the Department and high schools and chemical plants in our service area as well as other departments on campus. Communication from the PI to these three types of contacts will be initiated detailing the nature and goals of the project. The PI will offer assistance as service learning duties to the high school sector, solicit aid, in the form of information and recommendations, from the industrial sources and outline instrument availability and capability to potential university collaborators. Concepts beyond fundamental principles emphasized in the classroom as well as ancillary instrument supplies (chemicals, columns, etc.) purchased will be based on the information and needs indicated in these communications. Funding of the proposed project will enhance prospects of additional external sources of funding since it will make the PI's local colleagues (outside of the department) aware of the department's capabilities as related to the new instrument. This awareness can serve two purposes: to initiate new proposals focused on K-12 science education or interdisciplinary projects and to possibly receive donated equipment and supplies from industrial sources. Additionally, industrial contacts may request HPLC analyses (on a paid basis) for specialized samples their laboratories do not have the instrumental capabilities or the experienced personnel to perform at a much cheaper rate than that offered by labs in the private sector. This is becoming a more popular occurrence, particularly in the pharmaceutical industry as pharma companies outsource the R&D portions of drug development to multiple university laboratories in order to increase throughput and achieve complementary, less biased results for the ultimate goal of lowering costs in order to compete with foreign drug makers.

e.2 Promotion of Economic Development and/or Cultural Resources (10 points)

The ultimate goal of this project is to stimulate student interest in chemistry through the use of relevant and modern instruments in the laboratory. This should result in higher student retention, and more science graduates in the long term. This is important for Louisiana, especially in the region where Nicholls is located. Nicholls is about 30 miles south of the Mississippi river, at the midpoint between New Orleans and Baton Rouge . This area has an extremely high concentration of chemical plants. A competent local workforce is crucial to attracting and keeping major employers in the area. A gainfully employed citizenry provides the spending power needed to support local businesses and generate revenues for local government to provide important services to the public.

f. ADDITIONAL FUNDING SOURCES (4 points)

The PI has procured $2500 in "in cash" match funds from the University through the Department of Physical Sciences and student technology fees for purchasing supplies (chemicals, solvents, syringes, etc) and for funding a portion of the instrument data station, respectively.

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5. PREVIOUS BOARD OF REGENTS SUPPORT FUND AWARDS

The PI has not previously received funding from the Board of Regents

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

Budget and Budget Justification Pages

Directions: Each line item under the columns "Support Fund Money Requested," "Institutional Match," and "Private Sector/Other Match" must be itemized, fully explained, and justified **on a separate budget justification page(s).** Attach additional justification pages as needed.

Title of Proposal: **C:SI-REAL (Chemistry: Stimulating Interest through Relevant Experiences in the Analytical Laboratory)**
Project Director(s): **April Dupre**

Institution(s) of Higher Education: **Nicholls State University**

PROPOSED BUDGET:

	Support Fund Money Requested	Institutional Match[1]	Private/Other Match[2]
A. Equipment[3]	$25,000	$ 2,000 (in-cash)	
B. Software			
C. Supplies		$ 500(in-cash)	
D. Shipping/handling			
E. Installation			
F. Personnel training			
G. Other			
1.			
2.			
3.			
4.			
5.			
H. Indirect costs	Not allowed		
I. Maintenance	Strongly discouraged		
J. Total costs (A-I)	$25,000	$2,500	

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).

BUDGET JUSTIFICATION PAGE

A. Equipment

The total instrument cost is ***$27,000***, with funding provided from two sources: a Board of Regents enhancement grant and an institutional match using student technology fees.

The total requested for equipment from the Board of Regents is ***$25,000*** with monies purchasing a High Performance Liquid Chromatography (HPLC) system. The cost of this instrument includes the following components, along with instrument set-up and user training:

1. A binary pump
2. A variable wavelength UV-Vis detector
3. A manual injection platform
4. An instrument data station (including, but not limited to, a desktop PC, proprietary instrument software, printer, USB connector, and data cable)
5. A starter reverse phase C18 column.

Each of the listed instrument components is critical to the overall use of the equipment and therefore may not be eliminated from the overall request. This instrument will be used primarily (> 80%) for the instruction of the two core laboratory courses in the analytical chemistry discipline: quantitative analysis and instrumental analysis, Chem 302 and Chem 407 respectively. It may also be used, in a limited fashion, for select freshman chemistry laboratory (Chem 110) experiments or for experiments in the senior level research problems course (Chem 451) if it is not in use by the analytical chemistry classes. The American Chemical Society (ACS) lists in its most recent Undergraduate Professional Education in Chemistry degree program guidelines the following criterion for laboratory work in chemistry for an ACS-approved chemistry program: "It should give students hands-on experience with chemistry and the self-confidence and competence to use and understand modern instruments, particularly NMR, FT-IR and UV-vis spectrometers; GC, GC-MS, and ***HPLC*** instruments for chemical separations; and electrochemical instruments." Nicholls currently possesses an obsolete HPLC instrument that is more than 10 years old. It is not in use presently because the instrument integrator, the only means to extract data output on the instrument which must then be analyzed by hand, is broken. However, even when the integrator is functional, the manufacturer no longer offers technical support for the instrument model and it isn't equipped with a critical instrument component that nearly all more current instrument models, which students will be expected to operate in industrial jobs or graduate studies, possess:

1. An instrument data station which provides the following capabilities:
    a. An interactive user interface to control instrument operational parameters such as solvent flow rate, solvent composition, and detection wavelength
    b. A desktop PC (that is networked to the instrument hardware) with proprietary chromatographic software installed on it that allows users to graphically visualize, manipulate, and analyze data output in a variety of manners that are not possible on the instrument Nicholls currently possesses.

Although not the only benefit gained from a new instrument, it, along with technical support for instrument troubleshooting, are some of the most critical aspects on the list.

The ***$2,000*** institutional cash match, provided through student technology fees apportioned by Academic Computing, will be used to partially fund the instrument data station with technology hardware and software components (PC, printer, USB connector, data cable, proprietary data analysis and acquisition program).

C. Supplies

The institutional match for supplies is ***$500*** to be funded through the Department of Physical sciences. This money will be used to purchase consumables (HPLC-grade solvents: typically water, methanol, and acetonitrile and blunt needle gas-tight syringes) needed for routine instrument operation as well as reagents/chemicals to be used for student analysis.

Department of Physical Sciences
P.O. Box 2022
Thibodaux, LA 70310
985.448.4502
Fax: 448.4927

NICHOLLS
STATE UNIVERSITY
A MEMBER OF THE UNIVERSITY OF LOUISIANA SYSTEM

17 October 2007

To: April Dupre
Department of Physical Sciences

Re: Confirmation of match from Account # 210611

I would like to confirm your request for a cash match from the Department of Physical Sciences supplies budget (Acct # 210611) for the fiscal year 2008-2009 in the amount of $500, towards your LEQSF grant entitled "C:SI-REAL (Chemistry: Stimulating Interest through Relevant Experiences in the Analytical Laboratory)." Please accept this letter as proof of maximum commitment from this account.

Sincerely,

Vincent Giannamore

Vincent Giannamore
Department Head
Department of Physical Sciences

Academic Computing

P.O. Box 2036
Thibodaux, LA 70310
985.449.7173

NICHOLLS
STATE UNIVERSITY
A MEMBER OF THE UNIVERSITY OF LOUISIANA SYSTEM

Date: October 17, 2007

To: Ms. April Dupre
Department of Physical Sciences
College of Arts & Sciences

RE: Confirmation of Technology Fee Match

I would like to confirm your request for a cash match from the Instructional Technology Fee (account 526750) for the fiscal year 2008-2009 in the amount of $2,000, towards your Board of Regents grant entitled "*C:SI REAL (Chemistry: Stimulating Interest through Relevant Experiences in the Analytical Laboratory).*" Please accept this letter as proof of maximum commitment from the Technology Fee in the amount stated above.

I would like to thank you for finding innovative ways to leverage these monies through outside sponsorship. If you have any questions, please feel free to call me at extension 4196 or email me at Sherry.Rodrigue@nicholls.edu.

Thank You,

Sherry A Rodrigue

Sherry A. Rodrigue
Assistant Director of Academic Computing
Director of Instructional Technology

CC: Tom Bonvillain, Larry Howell, Debi Benoit

BIOGRAPHICAL SKETCH

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

Name APRIL DUPRE	Position Title INSTRUCTOR OF CHEMISTRY

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

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Nicholls State University	B.S.	1999	CHEMISTRY
Nicholls State University	B.S.	2000	MATHEMATICS
Louisiana State University	M.S.	2003	CHEMISTRY
University of Cincinnati	Ph.D.	2008 (expected)	BIOANALYTICAL CHEMISTRY

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 pastfive years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

Teaching Experience

- 08/2006-present Instructor of Physical Sciences, Nicholls State University
- 09/05-06/06 Freshman Chemistry Recitation TA, University of Cincinnati
- 5/05-07/05 Princeton Review instructor & tutor for MCAT Verbal and SAT
- 8/96-present High school and college tutoring in chemistry and math
- 9/03-12/03 Freshman Chemistry Recitation TA, University of Cincinnati
- 8/01-12/01 Analytical Chemistry Laboratory TA, Louisiana State University
- 1/01-5/01 Freshman Chemistry Laboratory TA, Louisiana State University
- 8/99-12/99 Developmental Mathematics Instructor, Nicholls State University

Courses Taught at Instructor Level

- Freshman Chemistry Laboratory, Spring 2007
- Analytical Chemistry Lecture, Spring 2007
- Analytical Chemistry Laboratory, Spring 2007
- General Chemistry Lecture (non-majors), Fall 2006
- Physical Science 101 (Physics), Fall 2006
- Physical Science 102 (Chemistry), Fall 2006

Awards and Honors

- ALA LabFusion Academic Grant Recipient, 2004 (University of Cincinnati)
- DIA Sensor Fellowship, 2004-2005 (University of Cincinnati)
- Research Associate's Fellowship, 2003, 2005-2006 (University of Cincinnati)
- Board of Regents Fellowship, 2000-2003 (Louisiana State University)
- LSU Graduate School Scholars Assistantship Enhancement Award, 2000-2003 (Louisiana State University)
- Chemistry Graduate Student Council, 2001-2002 (Louisiana State University)
- Procter and Gamble Scholar, 2000 (Louisiana State University)
- Graduated summa cum laude 2000 and 1999 (Nicholls State University)
- Thomas B. Holcombe, Sr. Mathematics Scholarship, 1999 (Nicholls State University)
- Nicholls State University Hall of Fame, 1999 (Nicholls State University)

- Scholastic Achievement in Chemistry Award, 1999 (Nicholls State University)
- Louisiana Board of Trustees Scholarship, 1995-1999 (Nicholls State University)
- Polymer Organic Chemistry Award, 1998 (Nicholls State University)
- Phi Kappa Phi Honor Society member, 1998 (Nicholls State University)
- President of Nicholls Chemical Sciences Society, 1997-1998 (Nicholls State University)
- Alpha Lambda Delta Honor Society Member, 1996 (Nicholls State University)
- Phi Kappa Phi Outstanding Freshman, 1996 (Nicholls State University)
- Thibodaux High School Co-Valedictorian, 1995 (Thibodaux High School)

Publications and Presentations

1. **April L. Dupre**, Justin S. Mecomber, CollinWetzel, H. Brian Halsall, William R. Heineman, Kenneth R. Wehmeyer, and Patrick A. Limbach, "Developing Polymer Microchips for CE-ESI-MS." Poster Presentation, ASMS, Seattle, WA, June, 2006
2. **April L. Dupre**, Justin S. Mecomber, H. Brian Halsall, William R. Heineman, Kenneth R. Wehmeyer, and Patrick A. Limbach, "Developing Polymer Microchips for CE-ESI-MS: Putting the Pieces Together." Oral Presentation, Ohio Mass Spectrometry Symposium, The Ohio State University Columbus, OH, March, 2006
3. **April L. Dupre**, Wendy D. Dominick, Justin S. Mecomber, H. Brian Halsall, William R. Heineman, Kenneth R. Wehmeyer, and Patrick A. Limbach, "Development of Polymeric Microchips for Use in Binding Studies." Oral Presentation, AICHE, Cincinnati, OH, November, 2005
4. **April L. Dupre**, Wendy D. Dominick, Justin S. Mecomber, H. Brian Halsall, William R. Heineman, Kenneth R. Wehmeyer, and Patrick A. Limbach, "Polymer Microchips for CE-ESI-MS." Poster Presentation, Oesper Symposium, University of Cincinnati, Cincinnati, OH October 2005.
5. **April L. Dupre**, Wendy D. Dominick, Justin S. Mecomber, H. Brian Halsall, William R. Heineman, Kenneth R. Wehmeyer, and Patrick A. Limbach, "EOF Characterization of Surface-Modified PMMA Microchips for Use With Electrospray Ionization Mass Spectrometry." Oral Presentation, Ohio Mass Spectrometry Symposium, The Ohio State University, Columbus, OH March 2005.
6. **April L. Dupre**, Wendy D. Dominick, Justin S. Mecomber, H. Brian Halsall, William R. Heineman, Kenneth R. Wehmeyer, and Patrick A. Limbach, "EOF Characterization of Surface-Modified PMMA Microchips." Poster presentation, Graduate Poster Forum, University of Cincinnati, Cincinnati, OH, March 2005
7. **April L. Dupre**, Wendy D. Dominick, Justin S. Mecomber, H. Brian Halsall, William R. Heineman, Kenneth R. Wehmeyer, and Patrick A. Limbach, "EOF Characterization of Surface-Modified PMMA Microchips." Poster presentation, Oesper Symposium, University of Cincinnati, Cincinnati, OH, October 2004
8. Wendy D. Dominick; **April Dupre**; Lianji Jin; Justin Mecomber; Patrick A. Limbach, "Plastic Microchips for Mass Spectrometry." Oral presentation American Society for Mass Spectrometry, Nashville, TN, June 2004
9. Janusa, Michael A.; Bourgeois, Jeffrey C.; Heard, Grant H.; Kliebert, Nicole M.; **Landry, April A.**, "Effects of Curing Temperature on the Leachability of Lead Undergoing Stabilization/Solidification with Cement," *Microchemical Journal* 1998, 60 (2), 193-197.
10. Janusa, Michael A.; Bourgeois, Jeffrey C.; Heard, Grant H.; Kliebert, Nicole M.; **Landry, April A.**, "Effects of Particle Size and Contact Time on the Reliability of Toxicity Characteristic Leaching Procedure for Solidified/Stabilized Waste," *Microchemical Journal* **1998**, 59(2), 326-332
11. Janusa, Michael A.; Bourgeois, Jeffrey C.; Heard, Grant H.; Kliebert, Nicole M.; **Landry, April A.** "Designing a Better Matrix for Solidification/Stabilization of Hazardous Waste with the Aid of Bagasse (Lignin) as a Polymer Additive to Cement," Pittsburgh Conference 1998, 1893.
12. Janusa, Michael A.; Bourgeois, Jeffrey C.; Heard, Grant H.; Kliebert, Nicole M.; **Landry, April A.** "Effects of Particle Size and Contact Time on the Reliability of Toxicity Characteristic Leaching Procedure for Solidified/Stabilized Waste," Louisiana Academy of Sciences 71st Annual Conference 1998, 76.

Collaborators

Patrick A. Limbach
Acting Chemistry Dept. Chair
University of Cincinnati
Dissertation advisor

John S. Thayer
Professor of Chemistry
University of Cincinnati
TA mentor

Michael A. Janusa
Chemistry Dept. Chair
Stephen F. Austin State University
Undergraduate research advisor while at NSU

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: APRIL DUPRE

Status of Support: ___Current _x_Pending ___Submission Planned in Near Future

Contract Number/Proposal Title: Chemistry: Stimulating Interest through Real Analytical Laboratory Experiences

Source of Support: LEQSF Traditional Enhancement

Award Amount (or Annual Rate): $_25,000_____ Period Covered:__June 2008-June 2009_____

Location of Activity: Nicholls State University

Person-Months or % of Effort Committed to the Project: __0.5 month___Cal Yr _____Acad ____Summ

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Status of Support: ___Current _x__Pending ___Submission Planned in Near Future

Contract Number/Proposal Title:

Source of Support: Board of Regents SELECT Grants Program

Award Amount (or Annual Rate): $__33,099_____ Period Covered:__12/1/07-12/31/08_____

Location of Activity: Nicholls State University

Person-Months or % of Effort Committed to the Project: _____Cal Yr _____Acad __1.0 month___Summ

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Status of Support: ___Current _x__Pending ___Submission Planned in Near Future

Contract Number/Proposal Title: Modernization of Computer Facilities for Chemistry Instruction

Source of Support: Board of Regents, Undergraduate Enhancement

Award Amount (or Annual Rate): $___38,024_____ Period Covered:__6/1/08-6/30/09_____

Location of Activity: Nicholls State University

Person-Months or % of Effort Committed to the Project: __0.5 month__Cal Yr _____Acad _____Summ

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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: Nicholls State University

Person-Months or % of Effort Committed to the Project: ___ __Cal Yr _____Acad _____Summ

(Form 3, rev.2007)

APPENDIX A

From: Reb Blanchard <BLANCRE@kellyservices.com>
To: <april.dupre@nicholls.edu>
Date: 10/18/2007 3:06:03 PM
Subject: LC usage in industry

Hi April,
My pleasure to lend some expertise to your project.
As we discussed, the industries that we support in this state are primarily Chemical Manufacturers, Refiners, contract labs, and a little food industry.
The Chemical Processing Industries do in fact ask for candidates that have hands on experience with instruments and not just theoretical knowledge of instrumentation. The most common of those are GC, MS, and HPLC usually in that order. We find an increasing need for HPLC and LC particularly in polymers research and analysis. The older industries such as refineries usually perfer GC/MS experience.
A quick search (although by no means do I assume this to be definitive) of my database showed at least 16 plants that I know of first hand using HPLC on a regular basis.
I hope this helps in developing your project and we look forward to assisting with other porjects as we are able.
Best regards,
Reb Blanchard

Reb Blanchard
District Manager
Kelly Scientific & Engineering Resources
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"Global Scope - Local Focus"

CC: Alison Smith <SMITHAF@kellyservices.com>