

**BOARD OF SUPERVISORS FOR THE
UNIVERSITY OF LOUISIANA SYSTEM**

ACADEMIC AND STUDENT AFFAIRS COMMITTEE

February 22, 2018

Item E.1. McNeese State University's request for approval of a Post Baccalaureate Certificate in Strategic Corporate Communication.

EXECUTIVE SUMMARY

McNeese State University requests approval to offer a Post Baccalaureate Certificate (PBC) in Strategic Corporate Communication. The proposed PBC is designed principally for individuals who have earned a baccalaureate degree in fields other than communication, but have since found careers in sales and/or marketing roles within their organizations. The intent is to provide students with the digital, oral, and written communication skills needed to succeed and thrive in corporate communication departments, organizational communication fields, and consulting industries. Not only will graduates be prepared to work in corporate settings, but they will have valuable skills that can be put to use in many nonprofit and governmental settings.

The 18-hour curriculum combines current theories of interpersonal, organizational, and relationship-based sales communication strategies. Courses required of the proposed PBC include: Introduction to Mass Communication, Introduction to Organizational Communication, Interpersonal Communication, Communication in Organizations, Sales Communication, and Advanced Sales Communication. All five (5) courses required of the proposed PBC are already offered as part of McNeese's Bachelor of Science (BS) in Mass Communication which completes an average of 33 students annually. In addition, delivery of the PBC will be entirely online in order to provide professionals in the workforce a means of developing their skills on their own schedules.

This proposed PBC in Strategic Corporate Communication will reach a new group of students who wish to advance their knowledge of corporate communication for use in their existing careers. Since the curriculum is already in existence, is already taught in the intended format, and utilizes classes that have available seats in them, the proposed PBC can be offered at no additional cost to the University. Likewise, it has the potential to increase enrollment at McNeese and reach a new target audience.

RECOMMENDATION

It is recommended that the following resolution be adopted:

NOW, THEREFORE, BE IT RESOLVED, that the Board of Supervisors for the University of Louisiana System hereby approves McNeese State University's request for approval of a Post Baccalaureate Certificate in Strategic Corporate Communication.



McNeese State University
Box 93300
Lake Charles, Louisiana 70609
(337) 475-5556 • (800) 622-3352 ext. 5556
Fax (337) 475-5012

Office of the President

E 1

January 29, 2018

Dr. James B. Henderson, President
University of Louisiana System
1201 North Third Street
Suite 7-300
Baton Rouge, LA 70802

Dear Dr. Henderson:

Enclosed are (5) copies of McNeese State University's request for approval to offer a PBC, Strategic Corporate Communication certificate program in the Department of Mass Communication.

Please place this item on the ULS Board of Supervisors' agenda for consideration and approval at the February 22, 2018 meeting.

Thank you for your attention in this matter.

Sincerely,

Dr. Daryl V. Burckel
President

Enclosures

**PROPOSAL to DEVELOP a NEW ACADEMIC CERTIFICATE PROGRAM
(CAS, PAC, PBC, GC, PMC, PPC)**

Date: 10/13/2017

Campus: McNeese State University	Program: CIP, Certificate Designation, Title 09.0901, PBC, Strategic Corporate Communication
Institutional Contact Person & Contact Info (if clarification is needed) Tracy Standley, 337-475-5951, tstandley@mcneese.edu	

1. Certificate Description

Describe the program concept: purpose and objectives; proposed curriculum; mode of delivery (on-site/hybrid/on-line). Indicate which courses are new; describe plan for rolling out new courses.

The certificate program is designed for professionals who are responsible for developing strategic corporate communication from organizational, cultural, and customer-centric perspectives. The program combines current theories of interpersonal, organizational, and relationship-based sales communication strategies.

The program is designed for 100% online delivery, giving flexibility to learners to gain skills and insight on their schedules.

Some of the preliminary objectives identified are:

-Students should develop the capacity to entertain multiple perspectives and interpretations with regards to interdependent organizational relationships and leadership roles.

-Students should develop an understanding of organizational culture and of the connections between themselves and others in relation to physical, historical, social, and global contexts.

-Students should develop breadth, defined as familiarity with essential concepts in major fields, and depth, defined as knowledge of strategic corporate communications.

-Students will demonstrate the ability to adapt communication strategies to a variety of professional settings and roles.

- Students will demonstrate the ability to deliver and prioritize concise and accurate summaries of customer needs assessments to all areas of the organization.

- Students will demonstrate the ability to measure, evaluate, and document findings as it relates to their performance and that of their organizations.

Curriculum:

The PBC in Strategic Corporate Communication will require 18 hours as listed below:

MCOM 131 Introduction to Mass Communication

Role of mass media in society, including newspapers, radio, television, advertising, public relations, and the Internet. Covers the basic functions of these media and their impact on American society, politics, and culture.

COMM 204 Introduction to Organizational Communication

Introduction to communication management in organizations. Experiential approach to provide students with the basic knowledge and skills needed to manage complex communication processes in organizations.

COMM 205 Interpersonal Communication

Study of skills necessary for communication competence while creating an awareness of how internal and external variables affect intimacy, defensiveness, and conflict management. Reviews theory behind these skills.

COMM 304 Communication in Organizations

Communication in both formal and informal situations in organizations. Required practical application of both oral and written skills with emphasis on motivation, interviewing, public relations, and oral communication network.

COMM 385 Sales Communication

Applied communication knowledge and skills in sales, including the sales process, team building, oral presentation, persuasive writing, and effective interpersonal communication, listening, and writing.

COMM 485 Advanced Sales Communication

Focuses on SPIN selling and relational selling approaches.

None of these classes are new; they are all offered as part of the BS in Mass Communication. The intention with the PBC is to reach a new audience with existing courses. These courses are already taught online.

2. Need

Outline how this program is deemed essential for the wellbeing of the state, region, or academy (e.g., how is it relevant, how does it contribute to economic development or relate to current/evolving needs). Identify similar programs in the state and explain why the proposed certificate is needed.

The post baccalaureate certificate in Strategic Corporate Communication is designed to advance the theory and practice of interpersonal, organizational, and sales communication. It is designed principally for students who have completed their undergraduate degrees in fields other than communication, but have since found careers in sales and marketing roles within their organizations. In our technology-driven global economy, the role of strategic interpersonal communications is evolving. Tomorrow's business conversations must not focus on features and benefits; but on insight. Corporate communications professionals must bring a unique (and typically provocative) perspective to their customers. The tempo of our global economy mandates a shift from order-takers to strategic partners in the marketplace.

This program is designed to provide students with the digital, oral, and written communication skills needed to thrive in the business-to-business marketplace, consulting sectors and in government roles. It will provide the theory and practical application necessary in developing a communications strategy, successful collaboration, creating and delivering effective presentations, writing clear and concise business correspondence, as well as methods of measurement and evaluation. The program is also designed to heighten the awareness of the processes and leadership techniques that strengthen organizations with respect to ethics, change management, and diversity.

The online delivery format is designed to give professionals in the workforce a means of developing their skills on their schedules. It is also designed to introduce a new type of student in the form of adult-learners to our department and institution.

3. Students

Describe student interest. Project enrollment and productivity for the first 5 years; justify projections.

With the post baccalaureate certificate, students will be prepared to enter corporate communication departments, organizational communication fields and consulting industries. Not only will graduates be prepared to work in corporate settings, but they will have valuable skills that can be put to use in many nonprofit and governmental settings.

The certificate is designed to meet a need for those holding existing baccalaureate degrees to increase their knowledge of communication theories to apply in their current positions in business.

4. Accreditation

Describe plan for achieving program accreditation.

Program will not be accredited.

5. Faculty, Administration, & Other Resources

LA BoR – AA 2.05 - Oct 2015

How will instructional needs be met: will additional faculty, facilities, equipment, or library resources be required? What department will deliver and oversee the proposed program?

No additional faculty, facilities, equipment or resources will be required. The PBC will be offered via classes already taught online and part of the department's regular class rotation.

6. Cost

Summarize additional costs to offer the program. On separate budget sheet, estimate costs and revenues for the projected program for the first five years, indicating need for additional appropriations (if any).

Since the classes are already offered online and are already part of the department's curriculum and course rotation, no additional costs are expected for the first five years. These classes are part of one of the department's bachelor's degree curriculum. This would only increase enrollment in existing classes that are taught as part of the faculty's existing teaching load.

This program will reach a new group of students who wish to advance their knowledge of corporate communication for use in existing careers. Since the curriculum is already in existence, is already taught in the intended format, and utilizes classes that have available seats in them; this proposed program will increase enrollment to the university and reach a new target audience with no additional costs.

CERTIFICATIONS:



Primary Administrator for Proposed Certificate

12/14/17
Date



Provost/Chief Academic Officer

12.14.17
Date

Management Board/System Office

Date Approved

SUMMARY OF ESTIMATED ADDITIONAL COSTS/INCOME FOR PROPOSED CERTIFICATE

Institution: McNeese State University

Date: 12/13/2017

Certificate Program, Unit: PBC Strategic Corporate Communication, Department of Mass Communication

FTE = Full Time Equivalent (use the institution's standard definition and provide that definition).

EXPENSES								
INDICATE ACADEMIC YEAR:	FIRST		SECOND		THIRD		FOURTH	
	AMOUNT	FTE	Amount	FTE	AMOUNT	FTE	AMOUNT	FTE
Faculty	\$ —		\$ —		\$ —		\$ —	
Graduate Assistants	\$ —		\$ —		\$ —		\$ —	
Support Personnel	\$ —		\$ —		\$ —		\$ —	
Fellowships and Scholarships	\$ —		\$ —		\$ —		\$ —	
SUB-TOTAL	\$ —		\$ —		\$ —		\$ —	
	AMOUNT		AMOUNT		AMOUNT		AMOUNT	
Facilities	\$ —		\$ —		\$ —		\$ —	
Equipment	\$ —		\$ —		\$ —		\$ —	
Travel	\$ —		\$ —		\$ —		\$ —	
Supplies	\$ —		\$ —		\$ —		\$ —	
Other (specify)	\$ —		\$ —		\$ —		\$ —	
SUB-TOTAL	\$ —		\$ —		\$ —		\$ —	
TOTAL EXPENSES	\$ —		\$ —		\$ —		\$ —	
REVENUES								
Revenue Anticipated From:	AMOUNT		AMOUNT		AMOUNT		AMOUNT	
*State Appropriations	\$ —		\$ —		\$ —		\$ —	
*Federal Grants/Contracts	\$ —		\$ —		\$ —		\$ —	
*State Grants/Contracts	\$ —		\$ —		\$ —		\$ —	
*Private Grants/Contracts	\$ —		\$ —		\$ —		\$ —	
Expected Enrollment	6		8		10		15	
Tuition	\$ 15,426		\$ 20,568		\$ 25,710		\$ 38,565	
Fees	\$ 10,224		\$ 13,632		\$ 17,040		\$ 25,560	
*Other (specify)	\$ —		\$ —		\$ —		\$ —	
TOTAL REVENUES	\$ 25,650		\$ 34,200		\$ 42,750		\$ 64,125	

* Describe/explain expected sources of funds in proposal text.

**BOARD OF SUPERVISORS FOR THE
UNIVERSITY OF LOUISIANA SYSTEM**

ACADEMIC AND STUDENT AFFAIRS COMMITTEE

February 22, 2018

Item E.2. University of Louisiana at Lafayette's request for approval of a PhD in Earth and Energy Sciences.

EXECUTIVE SUMMARY

The University of Louisiana at Lafayette (UL Lafayette) requests approval to offer a PhD degree program in Earth and Energy Sciences. A Letter of Intent (LOI) for this program concept was approved by the Board of Supervisors for the University of Louisiana System in June 2017 and, subsequently, by the Board of Regents (BoR) in August 2017. As required by BoR policy, the graduate program proposal underwent review by an external consultant. Dr. Scott King, Professor, Virginia Tech University, conducted the review and stated the following in his report:

The Earth and Energy Science Ph.D. program is a carefully thought out program that is timely and responsive to employment trends. It will build on and add to existing programs at ULL. With a minimal investment from the university this program should have significant impact both locally and nationally, producing scholars trained with a modern, interdisciplinary systems approach to solving real-world problems that face our society. I enthusiastically support the Earth and Energy Science program and look forward to seeing the success of the program in the coming years.

An academic program in earth and energy sciences is an interdisciplinary degree program that studies and explores energy and environmental challenges of today and the future. UL Lafayette's intended doctoral program will integrate the disciplines of Geology and Environmental Science with Chemistry and Physics to provide education and research opportunities for students in the areas of earth and energy sciences. The multidisciplinary nature of the intended degree program allows the coursework and research opportunities to extend well beyond a specialized area of study in geology or environmental science. The intended program concept will expose students to an interdisciplinary pathway, expanding their ability to create solutions to some of today's most challenging environmental problems.

The proposed doctoral program will increase the production of advanced STEM degrees in the state and, perhaps more importantly, will provide new upper-level educational and research opportunities in areas of high growth, where additional intellectual capacity is needed and, if provided, would pay large dividends to the state and local economies. The Louisiana Workforce Commission indicates that, over the next decade, 161 new positions will be created in the disciplines at the core of the Earth and Energy Sciences doctoral degree program. Although some of this anticipated growth can be partially satisfied by a workforce trained at the bachelor's and master's levels, the potential impact of doctoral-level scientists on energy and environmental challenges will be far more impactful. Currently, at the national level, over 2,000 academic vacancies that require a PhD open annually in the United States (US) in areas represented by the

proposed doctoral program. Consequently, demand for these future scientists will be larger here in Louisiana, as well as the entire US.

The planned 72-credit-hour curriculum consists of 12 hours of a structured, interdisciplinary core that integrates Chemistry, Environmental Science, Physics, and Geology. Outside of the prescribed core courses, the proposed curriculum will provide flexibility through 30 hours of elective coursework through which a student and advisor can craft a degree that best suits individual educational interests and aspirations. Although it is possible for students to seek out interdisciplinary interactions within a traditional PhD program at other universities by taking a variety of courses across disciplines, this intended program is deliberate about the interdisciplinary nature of the curriculum structure, research opportunities, and faculty collaborations. As evidence of the proposed program's commitment to the creation of an interdisciplinary program, the University recently hired two new faculty members who hold joint appointments in Physics and Geoscience.

UL Lafayette intends to recruit students from its existing BS and MS degrees in Chemistry, Environmental Resource Science, Geology, and Physics programs, which collectively average 48 completers annually. The intended program offers two admission tracks: the BS to PhD track, and the MS to PhD track. Regardless of the track, students would be required to hold a BS degree in Geology, Environmental Science, Physics, or Chemistry. Students with an MS degree can transfer up to 18 credit hours. The University also plans to expand its recruitment efforts to reach prospective students from other universities within Louisiana, as well as nationally and internationally. By combining four separate programs into an interdisciplinary PhD program, the University significantly expands the base of students from which it can recruit. An initial enrollment of five (5) students is expected in the first year, with the expectation that enrollment will grow to 20 by YR5.

The proposed program can be fully implemented with limited cost to UL Lafayette. There are 21 primary faculty members in Geoscience, Physics and Chemistry with research interests and expertise that align with the proposed doctoral program. No additional laboratory space or upgrades to existing infrastructure will be necessary for program implementation. Cost incurred for seven new and continuing graduate assistantships represents a necessary investment in the success of the program. The proposed program is an institutional priority for UL Lafayette because it will integrate and strengthen four separate science programs; provide new opportunities for students and faculty; increase the number of students receiving STEM degrees; and support the strategic direction for research at the University,

RECOMMENDATION

It is recommended that the following resolution be adopted:

NOW, THEREFORE, BE IT RESOLVED, that the Board of Supervisors for the University of Louisiana System hereby approves the University of Louisiana at Lafayette's request for approval of a PhD in Earth and Energy Sciences.



University of Louisiana at Lafayette

OFFICE OF THE PRESIDENT

P. O. Drawer 41008
Lafayette, LA 70504-1008
(337) 482-6203
Fax: (337) 482-5914
e-mail: president@louisiana.edu

Université des Acadiens

January 30, 2018

Dr. James B. Henderson
President
University of Louisiana System
1201 North Third Street, Suite 7-300
Baton Rouge, LA 70802

Dear Dr. Henderson:

This is a request for authority to offer a new degree program, the Ph.D. in Earth and Energy Sciences.

Please place this item on the agenda for consideration at the February 2018 meeting of the Board of Supervisors.

Sincerely,

A handwritten signature in blue ink, appearing to read "E. Savoie", written over the word "Sincerely,".

E. Joseph Savoie
President

svc

Attachment

Louisiana Board of Regents

AA 2.05: REQUEST FOR AUTHORITY TO OFFER A NEW DEGREE PROGRAM*

-- Including incremental credentials building up to the Degree --

** Prior to final action by the Board of Regents, no institution may initiate or publicize a new program.**

Date: September 28, 2017

Institution: University of Louisiana at Lafayette	Requested CIP, Designation, Subject/Title: CIP 40.0699, Interdisciplinary Geosciences; Ph.D. in Earth and Energy Sciences
Contact Person & Contact Info: Dr. Azmy S. Ackleh Dean, Ray P. Authement College of Sciences University of Louisiana at Lafayette (337)-482-6986 ackleh@louisiana.edu	
Date Letter of Intent was approved by Board of Regents: August 23, 2017	
Date this Proposal was approved by Governing Board:	
Planned Semester/Term & Year to Begin Offering Program: Fall semester, 2019	

1. Program Description

Describe the program concept: (a) purpose and objectives; (b) mode of delivery (on-site/hybrid/on-line). Describe plan for developing and rolling out new courses.

(a) Purpose and Objectives

Our purpose is to offer a cutting-edge, interdisciplinary Geosciences doctoral degree program that integrates the expertise of the School of Geosciences (Programs of Geology and Environmental Science) with that of the Departments of Chemistry and Physics at UL Lafayette to provide new education and research opportunities focused on energy and the environment. Students in our program will develop an inter- and multi-disciplinary understanding of issues central to meeting the Energy and Environmental challenges of today and the future. The objectives of our program will be to:

- Provide educational and research opportunities in the area of "energy" acquisition that go well beyond fossil fuels and will include developing opportunities in biofuels, geothermal energy, solar-, wave-, and wind-energy.
- Provide educational and research opportunities in the area of the "environment" that will include understanding the chemistry of soils and waters; studying the anthropogenic impacts of energy acquisition on soils and waters, specifically on ocean and land ecosystems; understanding climate change and pollution; and developing the skills to perform research aimed at mitigating problems to the environment associated with acquisition of energy.
- Prepare students to make fundamental contributions in the areas of earth and energy research, including how to apply their understanding of energy and the environment to solve real-world problems and to advance decision-making in business and regulatory arenas.

These objectives will be achieved in a sequential manner, first by exposing students to a specially-designed, multidisciplinary foundation of core courses in Physics, Geophysics, and the Chemistry of Earth systems, and then by exposing them to elective courses in their future area of expertise. Dissertation research will provide students with extensive hands-on opportunities to apply concepts and principles learned in their coursework to solving real-world problems.

We expect these efforts to result in more translational research, increased technology transfer, more research commercialization, and new and stronger business partnerships that will provide increased economic benefits to the State of Louisiana and to the nation. The establishment of the doctoral program at UL Lafayette in Earth and Energy Sciences will substantially enhance the existing undergraduate and master's-level degree programs in Chemistry, Physics, Geology, and Environmental Science on our campus by providing new research opportunities, spurring new collaborations, and giving students new opportunities to further their education. Finally, building an interdisciplinary

doctoral program in Earth and Energy Sciences from four existing programs on our campus will enhance the recruitment and retention of top faculty in each of these disciplines and, as a result, improve the scientific infrastructure of the University and the State of Louisiana.

(b) Mode of Delivery

Initially courses will be taught using traditional delivery methods, but opportunities may arise in the future for online or hybrid delivery of some individual courses.

Map out the proposed curriculum, in sequence, identifying any incremental credentials and/or concentrations within the degree. Indicate which courses will be new, including those that would be offered in the new program as electives. Describe any special requirements (e.g., internships, comprehensive exam, thesis, etc.).

Individual Development Plan:

Faculty members selected from each academic unit of the proposed Ph.D. program in Earth and Energy Sciences will form an interdisciplinary Graduate Advisory Committee that will work with each newly admitted student: (1) to develop an individual development plan (IDP); and (2) to tentatively place the student in one of the graduate student offices located in each of the academic units based on the student's initial plans and interests. The Graduate Advisory Committee will monitor the progress of each student in the first year of his or her degree program and will assist each student as he or she navigates through early coursework (largely multidisciplinary), then transitions to working individually with a major professor for dissertation research. At that point, the major professor and student will form the dissertation committee. The dissertation committee will then assume responsibility for supporting the student's IDP and for monitoring the progress of the student until he or she graduates.

SCH Requirements and Program Structure:

A total of 72 credit hours will be required beyond the B.S. degree. Students with a M.S. degree may transfer up to 18 credit hours. The breakdown of course requirements is as follows:

Core Courses	12 hrs	These are four interdisciplinary courses that will be taught by faculty specializing in Chemistry, Environmental Science, Geology, and Physics.
Additional Coursework	30 hrs	These courses will consist of a combination of existing courses (relevant graduate-level courses in Biology, Chemistry, Engineering, Geology, Environmental Science, Mathematics, or Physics) and newly-developed courses (doctoral-level courses in Geology, Physics, Chemistry, and Environmental Science). Students, in consultation with their dissertation committee, will develop a plan of study and will select courses in which to enroll based on their specific career goals and interests. As mentioned above, students who are admitted to the program with an M.S. degree in a closely-related field will be eligible to transfer up to 18 credit hours towards this 30 hour course requirement. To ensure that students have a strong multi-disciplinary background, they will be required to take at least 6 hours of coursework each in Geology, Environmental Science, Chemistry, and Physics. The remaining 6 hours can be taken in any of the aforementioned disciplines.
Graduate seminar	6 hrs	These hours will be accumulated from 6 semesters of taking a 1-credit hour graduate seminar course offered each semester. Seminars will include invited presentations from internal and external speakers with relevant content expertise or professional experience. Several speakers will address Ethics in Science. Otherwise, external speakers will include a mix (approximately 50/50) of academic researchers and industry professionals so that students can gain insight into fundamental research and applied research topics. Each student will be required to deliver at least one presentation at the graduate seminar each year, as he/she progresses through the doctoral program.
Dissertation research and dissertation	24 hrs	A minimum of 24 credit hours in dissertation research and/or dissertation must be completed. Dissertation hours are intended for research and/or writing related to a student's dissertation topic and conducted in the last two years of the degree program, after the student has been admitted to candidacy, a dissertation committee has been established, and the dissertation proposal has been approved by the dissertation committee. Dissertation hours will be supervised by the student's primary advisor/mentor and coordinated with his/her dissertation committee.
Total	72 hrs	

Additional Requirements:

- 1) *Grades:* Students must maintain at least a 3.0 cumulative GPA over the entire course of their program of study. No more than one course in which a grade of "C" is earned may be applied to the fulfillment of the degree requirements.
- 2) *General comprehensive exam:* The comprehensive exam will be administered at the end of a student's third semester of study. This exam will focus on the student's mastery of the content obtained from the courses taken within the program, and the application of this content to structuring research and solving problems. The comprehensive exam will be designed and administered by a committee of three graduate faculty members of the Earth and Energy Sciences doctoral degree program of the student's choosing (preferably professors who have taught core courses). Graduate faculty representing at least two separate disciplines will be required to prepare and evaluate the exam. Exams will be assessed by the faculty members who administered the exams, using rubrics to ensure consistency. A student must receive a score of 70% or higher on two of three subject matter tests and have an overall average score of 70% or better to pass the comprehensive exam. If a student fails more than one subject matter exam, he or she can re-take the failed exams with new questions within a period of time not to exceed a semester. No student will be permitted a third attempt. If the student fails the second attempt, he/she will be ineligible to continue in the program.
- 3) *Dissertation committee:* After successfully completing the comprehensive exam and prior to the proposal defense, the student, in consultation with his/her major advisor, must choose a formal dissertation committee. The dissertation committee will consist of the primary advisor/mentor and at least three additional graduate faculty members. The committee must include at least two graduate faculty members from a discipline represented by the doctoral program, but not that of the primary advisor. **Thus, each and every dissertation committee will be interdisciplinary in its composition.** An external committee member from another institution is recommended.
- 4) *Dissertation proposal defense:* Prior to the initiation of the student's dissertation study, an oral defense of the dissertation proposal will be presented to the student's dissertation committee. This proposal defense will lay out the plan for the research topic, goals, methods, and expected results along with any preliminary data. During the dissertation proposal defense, a student is expected to demonstrate knowledge gained in his or her coursework and additional readings, and the application of this knowledge to the proposed research plan. Students should demonstrate an understanding of the relationships among fundamental research and applied research applications in relation to their chosen research topic. Acceptance of the proposal by the major professor and a majority vote of the dissertation committee will be required. The dissertation proposal defense is expected to be completed after the student has passed the comprehensive exam and no later than the end of the third year of study.
- 5) *Dissertation:* The final examination will be a public, oral dissertation defense administered after the written dissertation is completed and reviewed by the student's dissertation committee. This oral exam will follow a traditional dissertation defense format used with the majority of science Ph.D. programs. The dissertation is expected to represent an original contribution within Earth and Energy Sciences and to be of quality acceptable for publication in peer-reviewed journals in the appropriate field of study. Submission of at least one manuscript to a peer-reviewed journal is a requirement for graduation.

Core Interdisciplinary Course Requirements:

1. EES 600. Introduction to Earth Systems (3 credit hours). This course will provide students with a fundamental understanding of the surface, subsurface, and atmospheric systems on Earth and modern observational tools employed to study these systems.
2. EES 601. Fundamentals of Environmental Science (3 credit hours). This course will prepare students to understand environmental problems, data collection, and analysis from the multi-disciplinary perspective of the physical sciences.
3. EES 602. Energy Systems (3 credit hours). This course will provide an overview of energy production systems, emphasizing research and data analysis within the petroleum, bioenergy, and sustainable energy sectors.
4. EES 603. Research Challenges in Earth and Energy Sciences (3 credit hours). The course will introduce recent research progress and methodologies employed to address specific challenges and solve problems associated with energy exploration and environment sustainability.

Elective Courses that can Fulfill Remaining Course Requirements:

**New courses; BIOL = Biology; CHEM = Chemistry; CIVE = Civil Engineering; EMGT = Engineering Management; ENVS = Environmental Sciences; GEOL = Geology; PETE = Petroleum Engineering; PHYS = Physics; MATH = Mathematics.*

Physical Science Disciplines

1. CHEM 501. PHYSICAL CHEMISTRY. (3, 0, 3). Advanced topics in physical chemistry including thermodynamics and kinetics of surfaces. Physical transport processes and chemical surface reactions will be discussed.
2. CHEM 506. PHYSICAL CHEMISTRY OF SURFACES. (3, 0, 3). Interfacial characteristics including the determination of surface properties and thermodynamic relationships; adsorption at, electrical aspects of, and reactions at surfaces. Applied topics emphasize nucleation, friction and lubrication, detergents and flotation, and emulsions and foams.
3. *CHEM/EES. 605 BIOENERGY APPLICATIONS. (3, 0, 3). An overview of biofuel production related to technologies and feedstocks, economics of producing biofuels and impacts on the environment and the local economy.
4. ENVS 569. BIOGEOCHEMICAL CYCLES (3, 0, 3). Focus on the biogeochemical cycles of carbon, nitrogen, phosphorus, and sulfur on both water and soil resources. Emphasis will include dynamics of these elements in the critical zone.
5. ENVS 580. FATE OF POLLUTANTS IN SOILS AND NATURAL WATERS. (3, 0, 3). Thermodynamics and surface reactions affecting the presence, distribution, and fate of pollutants.
6. *ENVS 585/EES. RENEWABLE ENERGY SOURCES. (3, 0, 3). Scientific and economic understanding of renewable energy resources, including biofuels, solar, wind, hydrogen, etc.
7. GEOL 502. ADVANCED SEDIMENTATION. (3, 0, 3). Sedimentary environmental and facies, with special emphasis on fluvial, deltaic, shoreline, deepwater, and eolian clastic facies.
8. GEOL 504. EXPLORATION GEOPHYSICS. (2, 3, 3). Introduction to the techniques of exploration geophysics.
9. GEOL 505. GEOTECTONICS. (3, 0, 3). Tectonic theories, with special emphasis on plate tectonics.
10. GEOL 506. SEISMIC STRATIGRAPHY. (3, 0, 3). Appearance of stratigraphic features on modern exploration seismic sections. Theory and real life examples integrated.
11. GEOL 508. SHALLOW SUBSURFACE GEOPHYSICS (3, 0, 3). Methods and approaches used in geophysics to investigate the shallow subsurface. Principles of electrical resistivity, electromagnetic methods and ground-penetrating radar. Refraction and reflection seismology and exploration using gravity. Equipment, field procedures, and experiment design. Data analysis and processing with inverse and forward modeling.
12. GEOL 509. ADVANCED GROUND WATER HYDROLOGY. (3, 0, 3). Discussion of case histories and examples that apply the basic principles of ground water hydrology to specific sites and problems. A summary of current thoughts, ideas, and practical applications related to hydrology.
13. GEOL 510. ADVANCED ENVIRONMENTAL GEOLOGY. (2, 3, 3). Content varies. May be repeated for credit. Application of geology to problems resulting from the increasingly intense use of the earth and its resources.
14. GEOL 531. ADVANCED CARBONATE SEDIMENTOLOGY. (1-4). Carbonate facies belts, some emphasis on hydrocarbon exploration. Field examples studied; up to three field trips to selected carbonate outcrop areas.
15. GEOL 532. PETROLEUM GEOCHEMISTRY. (2, 3, 3). Concepts and principles of geochemistry. Course includes examination of natural samples.
16. GEOL 535. ADVANCED TOPICS IN GEOLOGIC COMPUTING. (2, 3, 3). Image analysis, digital mapping methods, digital modeling of geologic systems, and export systems.
17. GEOL 540. ADVANCED STRUCTURAL GEOLOGY I. (3, 3, 4). Applied interpretation concepts of contractional and strike-slip terrains. Includes field work, geophysical, and remote sensing approaches.
18. *GEOL/EES 605. STABLE ISOTOPE GEOCHEMISTRY. (3, 0, 3). This course will explore the principles of stable isotope fractionation, including the O, C, and H isotope systems, but will also explore non-traditional stable isotope systems such as Ca, Mg, Si, Fe, Zn, etc.
19. *GEOL/EES 610. UNCONVENTIONAL RESOURCES. (3, 0, 3). This course will focus on shale gas/oil exploration and development.
20. *GEOL/EES 620. ADVANCED GEOPHYSICAL TECHNIQUES. (3, 0, 3). Signal processing, interpretation, and hands-on field-based instruction for understanding seismic and other geophysical data.
21. PHYS 521. TOPICS IN APPLIED PHYSICS: Applied Ion Beam Methods (1,2,3) (3, 0, 3). A use of high energy particle beams at the Louisiana Accelerator Center for material analysis with emphasis on geophysical and geochemical applications.
22. *PHYS/EES 601. PHYSICAL PROPERTIES OF MINERALS. (2, 1, 3) Understanding the physical properties of minerals such as metallic elements, their alloys and compounds, rocks, and non-metallic solids. Properties such as

elasticity, magnetism (iron is the most abundant element in Earth's composition), thermal conductivity, specific heat, thermal expansion, piezoelectricity, and piezomagnetism, are to be discussed. The course will introduce students to concepts of solid-state physics needed for setting up a base for understanding the physical processes that affect the defined properties. Experimental methods used to determine the discussed physical properties will be described.

23. *PHYS 602/EES. CLIMATE PHYSICS. (3, 0, 3). The course is intended as a starting point for students wishing to understand the physics of Earth's atmosphere. The main topics addressed are atmospheric dynamics, atmospheric (photo-)chemistry, and climatology. During the course the students will learn how to use fluid mechanics, statistical physics, chemical models, radiation balancing, and energy transfer processes to characterize the atmosphere. Time-permitting, a number of various interesting phenomena such as lightning and thunder, internal gravity waves, and the acoustic heating of the thermosphere will be addressed as applications.

Supporting Disciplines

1. BIOL 502. QUANTITATIVE ECOLOGY. (3, 0, 3). Quantitative methods for analysis in Ecological studies including ecological models, model selection, maximum likelihood estimation, and mark-recapture analysis.
2. BIOL 503. ECOLOGICAL MODELS AND DATA. (3, 0, 3). Theory and application of models and empirical analyses in ecology.
3. BIOL 575. STATISTICAL ECOLOGY. (4, 0, 4). Design, analysis, and presentation of results of ecological experiments and field studies, with emphasis on hypothesis testing and statistical modeling.
4. BIOL 580. MARINE ECOLOGY. (3, 0, 3). Discussions of basic principles of marine ecology, including productivity, dynamics of populations, factors affecting distribution, and interactions between organisms.
5. BIOL 605. ADVANCED TOPICS IN ENVIRONMENTAL BIOLOGY. (3, 0, 3). Research problems in environmental biology in areas other than that of the student's thesis or dissertation.
6. BIOL 615. BIOCHEMICAL ADAPTATION TO THE ENVIRONMENT. (3, 0, 3). Modification of basic biochemical structure and function that enable organisms to exist in extreme environments; enzymatic and metabolic adaptation to hypoxia, salinity, temperature, pressure, humidity, and light.
7. CIVE 506. ADVANCED HYDROLOGY. (3, 0, 3). Quantitative approaches for modeling rainfall-runoff processes. Topics include lumped and distributed models, treatment of spatial and temporal hydrologic variability, hydrologic data quality control, and design of hydrologic networks.
8. CIVE 546. PROBABILISTIC METHODS IN HYDROSCIENCE. (3, 0, 3). General review of advanced probability and statistics concepts, Monte Carlo simulation of hydro-systems, probabilistic models of observed hydrologic data, optimal estimation and interpolation of geophysical fields. Use of data-intensive computer applications is emphasized.
9. CIVE 561. WATER TREATMENT. (3, 0, 3). Design of domestic and industrial water treatment facilities with emphasis on the basic scientific principles underlying the design procedures.
10. CIVE 563. SOLID AND HAZARDOUS WASTE MANAGEMENT. (3, 0, 3). Current issues and legislation. Collection, storage and disposal. Treatment technologies including incineration and sanitary and hazardous waste landfills.
11. CIVE 567. EXPERIMENTAL ANALYSIS FOR ENVIRONMENTAL ENGINEERS. (0, 6, 3). Examination of laboratory techniques for assessing water quality and sludge contamination. Optical, electrical, gas chromatography, and x-ray methods are included.
12. CIVE 646. PROBABILISTIC METHODS IN HYDROSCIENCE. (3, 0, 3). Advanced probability and statistics concepts, Monte Carlo simulation of hydro-systems, probabilistic models of observed hydrologic data, optimal estimation and interpolation of geophysical fields. Use of data-intensive computer applications is emphasized.
13. EMGT 502. PROJECT ECONOMICS. (3, 0, 3). Procedures for conducting economic analyses used by technical managers. Fundamental methods followed by more advanced topics such as capital budgeting, leveraged investments, decision under risk and uncertainty, and use of modern software systems.
14. EMGT 550. ENGINEERING AND TECHNOLOGY MANAGEMENT. (3, 0, 3). Management principles and practices applicable to technical organizations.
15. PETE 501. FORMATION DAMAGE CONTROL (3, 0, 3). Fundamentals of formation damage mechanisms, damage characterization and control, basic clay minerals engineering, control of screen entrance velocity, well treatment design, and well flow back analysis.
16. PETE 502. HORIZONTAL WELL ENGINEERING. (3, 0, 3). Environmental remediation with horizontal wells, reservoir or acquirer fluid flow to horizontal wells, modern downhole assemblies and production/injection/completion of horizontal wells.
17. PETE 578. ADVANCED PRINCIPLES OF NATURAL GAS. (3, 0, 3). Covers the theory and practice involving natural

- gas from its initial location in the reservoir to its final destination, including the design of an optimum development plan for a natural gas field. Unconventional gas sources also covered.
18. PETE 586. SECONDARY RECOVERY PROCESSES. (3, 0, 3). Theory of multiphase flow, miscible and immiscible displacement mechanisms in porous media. Analysis of various improved recovery methods such as water flooding, gas flooding on digital computer.
 19. PETE 587. NATURAL WATER DRIVE SYSTEMS. (3, 0, 3). Theory of natural aquifer expansion and water encroachment in porous media using classical influence functions for finite and infinite aquifer of linear and radial extent. Numerical simulation of water encroachment in arbitrary shaped patterns with irregular well distributions.
 20. PETE 590. DRILLING OPTIMIZATION TECHNIQUES. (3, 0, 3). Methods and techniques to optimize drilling hydraulics, bit weight and rotary speed, penetration rates, and minimize drilling costs. Prereq: PETE 491.
 21. PETE 591. TRANSIENT PRESSURE BEHAVIOR. (3, 0, 3). Mathematical development and analysis of transient behavior in well and reservoir systems. Factors influencing skin effect evaluation in heterogeneous porous media. Effect of horizontal and vertical factors, anisotropy and shale barriers on reservoir limits tests.
 22. PETE 592. ADVANCED PETROLEUM PRODUCTION SYSTEM AND OPTIMIZATION. (3, 0, 3). Principles of the development and operation of petroleum production system. Considers the combined behavior of the reservoir, the producing strings, the surface equipment, and pipeline system. Optimization of such a production system for various schedules.
 23. PETE 593. ADVANCED GEOLOGIC WELL LOG ANALYSIS. (3, 0, 3). Study of advanced well logging methods and techniques for qualitative and quantitative use of well logs as geological mapping tools in hydrocarbon and mineral exploration.
 24. PETE 595. THEORY AND TECHNIQUES OF MATHEMATICAL RESERVOIR SIMULATION. (3, 0, 3). Comprehensive coverage of the mathematical reservoir simulator with special emphasis on the practical application of theoretical techniques on modern-day computers.
 25. MATH 495G. ADVANCED MATHEMATICS FOR ENGINEERS AND SCIENTISTS. (3, 0, 3). Systems of first order differential equations, partial differential equations, Fourier series, Sturm-Liouville systems, Hemholtz equation, Green's functions, applications in engineering and sciences.

2. Need

Outline how this program is deemed essential for the wellbeing of the state, region, or academy (e.g., how is it relevant, how does it contribute to economic development or relate to current/evolving needs).

WELL-BEING OF THE STATE

The proposed doctoral program in Earth and Energy Sciences acts on recommendations put forth in the FIRST Louisiana report and the BOR 2011 Master Plan, targeting the need for a skilled interdisciplinary workforce that can address current and future challenges associated with the Earth Sciences and Energy. More recent recommendations to the Louisiana Board of Regents presented by the Master Plan Research Advisory Committee in 2014 highlight the need for the development of new academic programs in interdisciplinary sciences such as the one we present here. Several of the specific advantages for Louisiana are presented below:

- This doctoral program will increase the production of advanced STEM degrees in the state by providing more upper-level educational and research opportunities in areas of high growth, where more intellectual capacity is needed. There is no doubt that the citizens of Louisiana and the rest of the world will need, in the near future, improved acquisition and utilization of energy while, at the same time, needing to minimize detrimental effects of acquiring and utilizing energy on the environment. While these goals are admirable, they will not be easily attained. The problems are complex and, accordingly, will require careful study by highly-qualified scientists. We propose to prepare the next generation of scientists to address these goals by using a multidisciplinary approach that emphasizes the development of problem solving skills. We expect that graduates of this program will assume prominent, leadership positions in industry and government and, accordingly, will be in position to directly impact these goals. Graduates will learn to foster more technology transfer, research commercialization, and new and stronger business partnerships, thereby providing a healthy return on investment for the State of Louisiana. The proposed doctoral program will provide educational and research activities at the doctoral level that are fundamental in the sense that they will involve education and research opportunities inherent to the core disciplines, but also will include applied research that involves more than one discipline. The program will emphasize a problem-solving approach to preparing students. For example, our capstone core course, EES 603: *Research Challenges in Earth and Energy Sciences*, will emphasize problem-solving and application-based research. In addition, students will be exposed to applied research through our graduate seminars that will

include a mix of industry professionals in addition to academic researchers. Understanding and articulating the relationships among fundamental research and applied research applications associated with their dissertation topics will be an expectation for passing the dissertation proposal defense.

- The proposed doctoral program will serve as a catalyst for greater collaborations among four existing degree programs at UL Lafayette. These new collaborations will be manifested in the doctoral degree program in Earth and Energy Sciences. The development of this doctoral degree program, its successful implementation as evidenced by student recruitment, extramural funding of academic research, and graduation of students, will elevate the academic profile of these departments and, therefore will lead to an enhanced ability to recruit and retain top faculty in the State of Louisiana. The scientific infrastructure of UL Lafayette and the State of Louisiana will improve with the development and implementation of the proposed doctoral program in Earth and Energy Sciences. **At UL Lafayette, we are strongly committed to interdisciplinary research and education and to preparing a strong faculty foundation for successful implementation of interdisciplinary programs.** In particular, two of our recent hires in the College of Sciences are interdisciplinary faculty who hold joint appointments in two departments. Dr. Gabrielle Morra holds a 2/3 appointment in the Department of Physics and a 1/3 appointment in the School of Geosciences. Dr. Rui Zhang holds a 2/3 appointment in the School of Geosciences and a 1/3 appointment in the Department of Physics. These faculty hires align perfectly with the proposed, interdisciplinary doctoral degree program in Earth and Energy Sciences. In the College of Sciences, our hiring plan includes making strategic, interdisciplinary faculty hires once existing faculty lines become available (for example after a retirement). Along these lines, our next planned interdisciplinary hire will be in the area of geochemistry. This faculty member will hold a joint appointment in the Department of Chemistry and in the School of Geosciences. Interdisciplinary faculty hires such as those currently in place and planned for the near future will help to ensure the successful implementation of our interdisciplinary degree program in Earth and Energy Sciences because the interdisciplinary faculty will be natural advocates for the interdisciplinary doctoral degree program. Consequently, the “academic silos” that might otherwise jeopardize an interdisciplinary degree program will not form here at UL Lafayette. Additionally, our faculty members who engage in interdisciplinary research, including the faculty members listed above, will serve as positive role models for our doctoral students. Finally, the successful implementation of the proposed doctoral program in Earth and Energy Sciences will bring positive national and international recognition to the University and the State of Louisiana.

The proposed doctoral program in Earth and Energy Sciences specifically addresses the following goals and objectives in the **BOR 2011 Master Plan**:

Goal 1, Objective 1.7: “Develop a Skilled Workforce to Support an Expanding Economy.”

The proposed doctoral program will prepare a new generation of scientists to support technical management and problem-solving in areas critical to the State of Louisiana in the energy sector as well as in environmental areas. Contributing to the development of a qualified labor pool in the domain of Earth Sciences will facilitate the attraction of new businesses to the area.

Goal 2, Objective 2.1: “Maintain and Build Strength in Foundational Science and Technology Disciplines Identified in FIRST Louisiana.”

Earth Sciences and Physical Sciences are targeted by FIRST Louisiana and these are precisely the areas we combine for the proposed doctoral degree program in Earth and Energy Sciences.

“Recruit, cultivate, and retain research talent in the foundational sciences.”

The addition of a doctoral program in Earth and Energy Sciences will allow UL Lafayette to greatly expand research and research training in Chemistry, Earth Sciences, and Physics. The establishment of a new doctoral degree program in Earth and Energy Sciences will create the necessary academic infrastructure to attract quality research-active faculty and, furthermore, provide an incentive for them to develop successful research careers at UL Lafayette. In particular, the addition of this doctoral program will allow graduate faculty in four degree programs (Geology, Environmental Science, Physics, and Chemistry) new access to doctoral students. Such access to doctoral students will significantly enhance the scope, quality, and productivity of faculty research.

“Develop and maintain cutting-edge infrastructure and facilities for fundamental science and technology research.”

We plan to leverage the doctoral program to secure new instrumentation through federal grants and plan to rely on

doctoral students to help operate and maintain equipment.

Goal 2, Objective 2.2: "Promote Multidisciplinary and Multi-Institutional Collaborative Research Efforts."

The proposed doctoral program in Earth and Energy Sciences integrates Chemistry, Environmental Science, Geology, and Physics. The program is multidisciplinary by design.

"Address multi-disciplinary and multi-institutional collaborations in campus research plans."

The proposed doctoral program in Earth and Energy Sciences employs a multidisciplinary approach to prepare scientists. Accordingly, the proposed doctoral program is consistent with the University of Louisiana at Lafayette's strategic plan for advancing interdisciplinary and multidisciplinary research and research collaboration.

Goal 2, Objective 2.3: "Sustain and Advance Research Commercialization and Translational Activities that Promote Economic Development in Louisiana."

We are embracing translational research as a focus area in our program with the aim of bridging the gap between fundamental research and applied research. In particular, doctoral students will be prepared to solve problems associated with the acquisition and utilization of energy in ways that minimize deleterious effects on the environment.

"Promote Multidisciplinary and Multi-Institutional Collaborative Research Efforts."

As described in Goal 2, Objective 2.2 (above), the proposed doctoral program in Earth and Energy Sciences will require doctoral students to complete coursework and research training derived from multiple disciplines. Such preparation will foster joint research efforts. Many of our faculty members already are collaborating across these disciplines, both within and outside of the university. The addition of the interdisciplinary doctoral program in Geosciences will further expand multi-institutional research opportunities, as we anticipate involving high-caliber research faculty from other institutions as 'outside faculty members' serving on the dissertation committees of our doctoral students. Their involvement in student dissertation research projects will foster collaboration between our research faculty and these 'outside faculty members'.

"Foster networking and strategic collaborations between higher education, government, and Louisiana's existing and prospective high-growth industry sectors."

Louisiana's high-growth industry sectors include *Energy Production* and *Coastal Resilience*. Our concentration areas include Energy and the Environment (which includes coastal environmental systems). Hence, the framework and educational approach of the proposed doctoral program in Earth and Energy Sciences will embrace translational research that will readily foster productive collaborations between higher education, industrial and government partners. We have established partnerships with more than a dozen companies and businesses that offer internships for our students at the undergraduate and M.S.-degree levels. These relationships will be strengthened and expanded with the implementation of the proposed doctoral program in Earth and Energy Sciences.

"Build capacity in areas of competitive advantage and target niches which align with campus and State research priorities."

As described above, the target niches of this program are closely aligned both with the research priorities of UL Lafayette and the State of Louisiana. By filling these niches, we add new educational opportunities and value to our students, our community, and society.

EMPLOYMENT PROJECTIONS

State Demand

The data in Table 1 suggest that 370 new positions that overlap with skillsets of our Earth and Energy Sciences Ph.D. graduates will be available annually from 2014 to 2024. Much of this growth will be satisfied by a workforce with Bachelor's and Master's Degrees and the extent to which Ph.D.-level candidates will be preferred is not known. The doctoral-level graduates will be suitable for leadership and management positions. Hence, the strong overall need for scientists in these physical science fields is a good indication of the need for qualified job candidates at all levels. For example, the need for academic (post-secondary) positions in these areas, where a Ph.D. is frequently required, is expected to increase by 70 positions by 2024 in Louisiana alone. Moreover, some of the demand for in-state Ph.D. scientists of this type is not captured in the current demand projections for Louisiana because state job projections do not account for state/federal agencies and private research groups that may have headquarters located outside of Louisiana. Nor do these projections include consultants and self-employed professionals, an exponentially growing

employment segment in geosciences. Finally, there may be considerable growth in the energy sector outside of the oil and gas industry. Start-up companies will need scientists in these areas of biofuel technology and development as well as conventional energy companies that aim to expand their operations.

Table 1.
Physical Sciences occupational projections for Louisiana
(Source: Louisiana Workforce Commission – Long-term Occupational Projections)

SOC Code	Occupational Projections for Louisiana	Projected annual openings 2014-2024
19-2042	Geoscientists	70
19-2041	Environmental Scientists and Specialists	220
11-9121	Natural Science Managers	20
19-2031	Chemists	60
TOTAL		370

National Demand

By 2024, almost 2,000 academic positions that require a Ph.D. are projected to open annually in the United States in areas represented within the Earth and Energy Sciences program (Table 2). Considering the strong national focus on inter- and multi-disciplinary research associated with Energy (fossil fuel, biofuels, and other renewables) and the Environment (pollution, water resources), our graduates will be in a strong position to fill growing academic demand in these sectors. We also expect substantial growth in demand at the national level for Ph.D. level scientists at research Institutes and within federal government agencies (e.g., USGS, EPA, DOE, etc.).

Table 2.
Academic job estimates nationally
(Source: US Bureau of Labor Statistics)

Occupational Code	Occupational Title	Projected average annual openings 2014-2024
25-1051	Atmospheric, Earth, Marine, and Space Sciences Teachers, Postsecondary	350
25-1053	Environmental Science Teachers, Postsecondary	180
25-1054	Physics Teachers, Postsecondary	580
25-1052	Chemistry, Postsecondary	880
TOTAL		1990

The supply of newly-trained geoscientists falls remarkably short of future geoscience workforce demand and replacement needs. Forty-three percent of the current geoscience workforce is at or near retirement age. AGI's 2014 *Workforce Report* illustrates that the majority of current researchers at federal agencies are at retirement age or are rapidly approaching it. The Bureau of Labor Statistics indicates that all Geoscience jobs will increase by 10% from 2014 to 2024. In addition, a 2011 article in the journal *Nature* (Perkins, 2011; *Nature* 473, 243-244 doi:10.1038/nj7346-243a) explains that one of the geoscience employment sectors poised for the most growth is consultancy. This anticipated job growth will provide opportunities for geoscientists equipped with a strong set of fundamental skills, particularly postdocs with several years' worth of experience who elect to leave academia, and mid-career researchers who choose to leave government positions. The article goes on to state that "many of today's senior geoscientists were trained as specialists in relatively narrow disciplines, but in the future, most demand

will be for researchers who have been trained to appreciate the interdisciplinary nature of the Earth sciences." The focus of the proposed Ph.D. degree program is to provide interdisciplinary courses and research opportunities to our students in order to prepare them to become the next generation of interdisciplinary scientists in Geosciences.

According to statistics provided by the U.S. Bureau of Labor, employment of physicists is projected to grow seven percent from 2014 to 2024. According to several surveys conducted by the National Science Foundation over the last four decades, the private sector is the largest single employment base of Physics Ph.Ds. Having an interdisciplinary doctorate degree will make our graduates more competitive for private sector jobs, particularly in Louisiana. The median starting salary for these jobs is \$90,000 for Physics Ph.D. recipients, which is considerably higher than \$51,000 for B.S. degree and \$60,000 for M.S. degree recipients in the same sector. This is indicative of a greater economic value of the Ph.D. degree for future careers. *"Physics Ph.D.s in potentially permanent positions experienced the greatest diversity concerning the field in which they are working. Forty-four percent of the Ph.D.s who accepted potentially permanent positions are working outside the field of physics, with the field of engineering comprising the largest portion of this group"* (Source: www.aip.org/statistics). Physics graduates have one of the lowest unemployment rates. In 2015, the *Fortune* magazine ranked Ph.D. degree in Physics as the 5th best graduate degree for the job market.

The demand for chemists, notably those with advanced degrees, is expected to increase at a 3% rate until 2024 (Source: U.S. Bureau of Labor Statistics). In practice, the demand for recent Chemistry graduates will be significantly higher, due to an over-aged workforce: in 1990, 43.5% of all chemists were under the age of 40, compared to only 25.8% in 2015. During the same time frame, the fraction of chemists within the labor force who hold a Ph.D. has increased from 56.3% to 69.6%, indicating a steady shift towards more highly-trained chemists (Source: ChemCensus 2015, American Chemical Society). In 2015, the median salary for Ph.D. chemists was \$105,000, as compared to \$77,000 for B.S. chemists and \$87,000 for M.S. chemists, reflecting the economic value of a Ph.D. (Source: American Chemical Society). Currently, chemists fill 23,000 direct jobs in Louisiana and generate \$2.2B in payroll, making it one of the leading states to offer employment opportunities for chemists (Source: American Chemistry Council).

Finally, because our doctoral graduates will have extensive, interdisciplinary coursework and research experience in Geology, Environmental Science, Physics, and Chemistry, they will be more competitive for a larger number of job opportunities than doctoral graduates from more-conventional degree programs that offer training in only a single discipline (e.g., Geology, Environmental Science, or Physics, or Chemistry). Furthermore, because our interdisciplinary program in Earth and Energy Sciences emphasizes translational research, our doctoral graduates will be competitive for industrial, governmental agency, and academic job opportunities.

Describe how the program will further the mission of the institution.

The University of Louisiana at Lafayette is the largest member of the University of Louisiana System and is designated within the Carnegie classification as a Doctoral Research University with Higher Research Activity. In addition to the pursuit of excellence in education and research at all levels, the mission of the University is to promote regional economic and cultural development, to explore solutions to national and world issues, and to advance its reputation among its peers. The proposed doctoral program in Earth and Energy Sciences will advance UL Lafayette's existing status as a research university and support UL Lafayette's mission by producing graduates who will strengthen the local and regional economy, but who will also bring honor and prestige to Louisiana as they find employment in other regions of the U.S. and internationally.

The proposed Ph.D. program in Earth and Energy Sciences is an institutional priority for UL Lafayette because it will integrate and strengthen four separate science degree programs, provide new opportunities for our students and faculty, increase the number of students receiving STEM degrees, and support the strategic directions for research at the University. Among other key disciplines, UL Lafayette aims to become a leader in research and education focused on Energy and the Environment, and aspires to become a leader in translational research in Earth and Energy Sciences by bridging the gap between fundamental research and application-based research. Hence, the focus of this doctoral program fits perfectly within the strategic research and educational interests of our University.

Identify similar programs in the state and explain why the proposed one is needed: present an argument for a new or additional program of this type and how it will be distinct from existing offerings.

According to the Louisiana Board of Regents degree inventory, Louisiana State University has individual Ph.D. programs in Geology, Environmental Science, Physics, and Chemistry. The University of New Orleans has a Ph.D.

program in Chemistry and an interdisciplinary Ph.D. program in Engineering and Applied Science. The latter degree is an umbrella program for 9 disciplines, which include Physics and Earth and Environmental Science. Table 3 summarizes the Ph.D. programs at UNO and LSU that have partial overlap with our proposed program.

Table 3.
Ph.D. degree programs at LSU and UNO
that are related to the proposed Ph.D. in Earth and Energy Sciences

Institution	Degree	Administered by	Concentrations or focus areas
Louisiana State University	Ph.D. in Environmental Science	Department of Environmental Science in the College of the Coast and Environment	Biophysical Systems; Environmental Planning and Management; Environmental Assessment and Analysis
Louisiana State University	Ph.D. in Geology	Department of Geology and Geophysics	Evolution of Sedimentary Systems and Earth Materials and Solid Earth Processes
Louisiana State University	Ph.D. in Physics and Astronomy	Department of Physics and Astronomy	Astronomy, astrophysics, gravitation and relativity, nuclear and particle physics, medical physics, materials physics, atomic/molecular/optical physics, and quantum optics and computing.
Louisiana State University	Ph.D. in Chemistry	Department of Chemistry	New methods for synthesis of biomedically important compounds, nanomaterials, energy storage, computational models for assorted phenomena, ultra-fast lasers, and designer polymers.
University of New Orleans	Ph.D. in Chemistry	Department of Chemistry	Analytical Chemistry, Biochemistry, Inorganic, Medicinal, Materials, Organic, and Physical Chemistry.
University of New Orleans	Ph.D. in Engineering and Applied Science	Jointly run by Colleges of Science and Engineering	Civil and Environmental Engineering, Electrical Engineering, Mechanical Engineering, Naval Architecture/Marine Engineering, Engineering Management, Physics, Mathematics, Earth and Environmental Science, Computer Science.

Why our program is different:

The proposed doctoral program in Earth and Energy Sciences will benefit students who desire an inter-disciplinary and multi-disciplinary doctoral degree in the Physical Sciences with particular applicability to Environmental research. The proposed doctoral degree program provides coursework and research training opportunities pertinent to each of the partnering disciplines. Thus, each student in this program will receive 12 hours of structured interdisciplinary coursework that integrates Chemistry, Environmental Science, Physics, and Geology. This approach of requiring a core set of interdisciplinary courses for every student in our program is unique to our program and distinct from traditional Ph.D. degree programs in a single discipline. This approach will ensure that every student will receive adequate 'breadth of interdisciplinary training' in the Earth and Energy Sciences. An additional 30 hours of coursework and dissertation research will ensure that the students receive adequate 'depth of training' in the Earth and Energy Sciences. Although it is possible for students to seek out interdisciplinary interactions within a traditional Ph.D. program at other universities by taking some courses in other disciplines or programs, it is not part of their required curriculum structure. This proposed approach is also distinct from umbrella programs that encourage interdisciplinary coursework but do not require a specific set of interdisciplinary courses for all of the students. By requiring a core inter-disciplinary or multi-disciplinary foundation, our graduates will be especially well prepared to engage and solve problems across disciplines because they will have been prepared in Physics, Chemistry, Geology, and Environmental Science with an emphasis on problem solving. Each student admitted to the proposed doctoral program in Earth and Energy Sciences will be advised by interdisciplinary

faculty committees. Incoming students will meet with the graduate advising committee in order to prepare an Individual Development Plan for the student. By design, the graduate advisory committee is interdisciplinary in its composition. The graduate advising committee will monitor and advise each student through the early phase of the degree program until that student selects a major professor. In consultation with the major professor, the student will then form a dissertation committee, the composition of which must be interdisciplinary. The dissertation committee will mentor the student through the remainder of his/her degree program until graduation. Thus, the proposed Ph.D. degree program requires: (1) that students receive a consistent core of interdisciplinary coursework and; (2) that students be advised and mentored by interdisciplinary committees of faculty members. This approach ensures that each student has ample opportunity to access interdisciplinary information and ample opportunity to access faculty expertise across disciplines in the physical sciences. Accordingly, graduates of this program will be ideally suited to pursue a wide range of career options in a variety of Physical Science and Environmental Science disciplines (e.g., academic careers in Chemistry, Geology, Physics, and Environmental Science programs, research scientists with organizations such as the EPA, DOE, and USGS, state government positions with organizations such as LDEQ and LDNR, and industry jobs in oil and gas, bio-fuel/tech, environmental management/consulting).

If approved, will the program result in the termination or phasing out of existing programs? (Is it a replacement?) Explain.

The program will not result in the termination or phasing out of existing programs, nor is it a replacement for any existing programs.

If a Graduate program, cite any pertinent studies or national/state trends indicating need for more graduates in the field. Address possibilities for cooperative programs or collaboration with other institution(s).

As was discussed above, considerable job opportunities are anticipated at the state (370 annually) and federal levels (approximately 2,000 annually) for Ph.D. level scientists in Geosciences. Additional opportunities are likely to be available to Ph.D. level physicists and chemists, where significant salary incentives distinguish Ph.D.-level scientists from M.S.-level scientists. In addition to academic appointments, job opportunities are anticipated in state and federal agencies concerned with regulating energy acquisition or with mitigating environmental impacts of energy acquisition. Finally, job opportunities are anticipated in the private sector where our graduates will serve as consultants or as experts in the energy sector as well as in environmental arenas. The involvement of research faculty from other institutions as 'outside members' of dissertation advisory committees will foster collaborative research initiatives.

3. Students

Describe evidence of student interest. Project the source of students (e.g., from existing programs, or the prospects of students being recruited specifically for this program who might not otherwise be attracted to the institution).

We plan to recruit students on our campus who receive B.S. or M.S. degrees in Chemistry, Environmental Resource Science, Geology, and Physics (more than 115 students annually). We will also strongly recruit B.S. and M.S. students from other universities in our state, as well as nationally and internationally. By combining four separate programs in our interdisciplinary Ph.D. program, we will greatly expand the student population from which we can recruit. One of our initial strategies will be to disseminate recruiting information to the relevant programs (including HBCUs) that offer B.S. and M.S. degrees in the Gulf Coast region. We will additionally use resources such as the GRE exam search service, the McNair Scholars Directory, and online directories to identify potential candidates who have demonstrated graduate-level readiness for our program and we will reach out to all of them via e-mail. Such efforts have been a successful recruiting approach for our other graduate programs. In addition to these efforts, we plan to build social media and SEO-based recruitment initiatives.

To assess demand for such an interdisciplinary Ph.D. program among our current students, we conducted surveys of undergraduates and graduate students majoring in Geology, Physics, and Environmental Sciences at UL Lafayette. Of the 169 student respondents, 38% expressed intent to continue their graduate education on a full-time basis. When asked "if UL Lafayette offered a Ph.D. program in your field of study that would prepare you for success in either the academic environment or in industry, would you be interested in enrolling," 47% responded "yes." Corroborating this strong expression of interest, 39% of the respondents indicated (on a 1 to 10) scale that they would likely pursue a Ph.D. in Geosciences at UL Lafayette, while 17 students indicated they would definitely enroll in such a program (by indicating a 9 or 10, where 10 represented "complete certainty"). We also inquired about geographic preferences for school location in pursuing a Ph.D. in Geosciences. Fifty-six percent expressed a definite interest in staying in the State of Louisiana, and 32% (or 54 students) indicated an absolute preference for continuing on to their doctoral education at UL Lafayette. Interestingly, 33% of the sample indicated that they would pursue a Ph.D. in Geosciences

but *only if* it was offered at UL Lafayette. The primary two motivators for students seeking a Ph.D. in Geosciences were: (1) the chance to learn more about their profession, (2) the opportunity to earn a higher salary. Results also suggest that about 55% of respondents would intend on working in academia and 45% in industry upon completion of a Ph.D. in Geosciences. Ten students indicated they had already decided to pursue a Ph.D. immediately following graduation as a definite career plan. A separate survey administered to students in Chemistry. Of the 32 respondents, 27 (79%) were considering graduate studies either at the M.S. or Ph.D. level.

Project enrollment and productivity for the first 5 years, and explain/justify the projections.

Projected Student Enrollment:

Table 4.
Projected enrollments and student funding mechanisms for years 1-5.

Year	Total Enrolled	Funding			
		Industry-Funded	Self-Funded	Research-Funded	University-Funded Graduate Assistantships ¹
1	5	0	0	1	4
2	10	1	0	2	7
3	15	3	1	3	8
4	18	3	2	5	8
5	20	4	2	6	8

¹This includes 4 new, continuing assistantships in year 1 and 3 new, continuing assistantships in year 2 (for a total of 7). One additional assistantship originally allocated to the Geology M.S. degree program will be shifted for use in the Ph.D. program.

The enrollment projections in Table 4 appear to be in line with other Ph.D. programs in the Physical Sciences. For example, LSU's Ph.D. program in Geology had enrollments of 16, 17, 20, 26, and 29 in the Fall semesters of the 2010-2011, 2011-2012, 2012-2013, 2013-2014, and 2014-2015 academic years, respectively. We plan to continue to grow enrollment after the program has been established in the first five years.

Provide enrollment/completer data for closely related programs currently offered at the institution.

UL Lafayette's undergraduate programs in Chemistry, Geology, Environmental Science, and MS degree programs in Geology, Physics, and Environmental Resource Science are the most closely related in that they may serve as feeders into our Ph.D. program. Enrollment data for these programs are compiled from 2011 through 2015 in Table 5 and graduation data are presented in Table 6. There is no competition with this newly proposed Ph.D. program and other Ph.D. programs on our campus.

Table 5.
Enrollment by Semester

	SP12	FA12	SP13	FA13	SP14	FA14	SP15	FA15	SP16	FA16
Chemistry (BS)	159	174	152	167	143	161	130	169	138	140
Geology (BS)	63	85	80	91	89	98	90	103	94	87
ENV Sci (BS)	22	31	37	52	57	66	55	73	66	64
Physics (MS)	4	6	6	8	4	7	5	11	11	13
Geology (MS)	49	49	49	66	64	69	72	88	83	87
ENV Res Sci (MS)	This program will begin in fall 2017									

Table 6.
Degrees Awarded by Year

	2011/12	2012/13	2013/14	2014/15	2015/16	5 year Ave

Chemistry (BS)	16	14	18	24	17	18
Geology (BS)	6	5	23	8	14	11
ENVS Sci (BS)	NA	NA	2	5	10	NA
Physics (MS)	3	3	4	1	2	3
Geology MS	11	11	12	10	18	12
ENVS Res Sci (MS)	This program began in Fall 2017.					

What preparation will be necessary for students to enter the program?

Admission:

UL Lafayette uses a portfolio approach to graduate admission that involves a thorough evaluation of student capabilities measured by several metrics inclusive of the GRE Exam (Graduate Record Exam), TOEFL (Test on English as a Foreign Language), written essays (e.g., both writing samples and personal statements), reference letters, and evaluation of transcripts from previous educational institutions. Of these, only academic record, TOEFL scores, and GRE results are directly measurable. Hence, for direct admission (B.S. to Ph.D.), the proposed program in Energy and Earth Sciences will require students to hold a B.S. in Geology, Environmental Science, Physics, or Chemistry (or a related field as determined by program faculty), with at least a 3.0 cumulative GPA in their B.S. program. Post-M.S. students who apply must also have their degrees in Geology, Environmental Science, Physics or Chemistry, and have a cumulative graduate GPA of at least 3.3. All incoming students must have completed (at a minimum) two classes and associated labs each in Geology, Physics, and Chemistry (i.e., a total of six lecture classes and six lab classes) and must have completed Calculus I and II. The preferred GRE score expectations for all applicants for the proposed doctoral program will be a verbal score of 145 and total verbal + quantitative score of 294.

If a Graduate program, indicate & discuss sources of financial support for students in the program.

By year two, UL Lafayette will support seven new and continuing Ph.D.-level graduate teaching assistantships for this program, which include monthly stipends as well as tuition waivers. Four assistantships will be made available for the first year of the program, and three additional assistantships will be granted for the second year, for a total of seven assistantships henceforth. As the program grows beyond initial projections (Table 4), the additional tuition revenue may support additional assistantships. Graduate assistantships are important for recruiting and retaining highly qualified students. Graduate assistantships help to offset faculty workloads, which are expected to increase with the inception of the doctoral program proposed. The cost of the requested four assistantships will be offset by in-state and out-of-state tuition revenue from full-time students enrolled in the program.

Additionally, a significant number of graduate assistantships are funded by external research funding. Indeed, the Office for Research provides incentives for including graduate student funding in such proposals. In this instance, it is the University's expectation that, in addition to the graduate assistantships funded by the Graduate School, a significant percentage of the students funded as GRAs will be supported by the faculty's external research funding and industry-funded initiatives. The average annual research funding for the academic units participating in the proposed Ph.D. program in Earth and Energy Sciences is \$2,566,180 (based on the most recent 6-year average). These data suggest that from eight to twelve doctoral students could be supported through external funding based on our current rate of research funding, depending on other budgetary needs of the grant awards.

We have secured substantial support for the Ph.D. program from a variety of industry partners (listed below). Most of our students in our existing B.S. and M.S. programs in the physical sciences participate in internships. We expect to continue these relationships by extending internship opportunities to Ph.D. students.

The following organizations indicated their support for the creation of this program.

- Chevron
- Halliburton
- Schlumberger
- Stone Energy
- KourCo Environmental Services

- Fugro Geoservices
- ASV (Autonomous Surface Vehicles)
- Ion Energy
- Eni US Operating Co.
- Fenstermaker

4. Faculty

List present faculty members who will be most directly involved in the proposed program: name, present rank; degrees; courses taught; other assignments.

Primary Faculty are listed below, all with doctoral degrees and the appropriate graduate faculty status

- Dr. Katie Costigan, Assistant Professor, Environmental Science
- Dr. August A. Gallo, Professor, Chemistry
- Dr. Raphael Gottardi, Assistant Professor, Geology
- Dr. Aubrey Hillman, Assistant Professor, Geology
- Dr. William A. Hollerman, Professor, Physics
- Dr. Thomas Junk, Professor, Chemistry
- Dr. Gary Kinsland, Professor, Geology
- Dr. Febee Louka, Associate Professor, Chemistry
- Dr. Gabrielle Morra, Assistant Professor, **Physics/ Geology (Interdisciplinary joint faculty hire)**
- Dr. Andi G. Petculescu, Assistant Professor, Physics
- Dr. Gabriela L. Petculescu, Associate Professor, Physics
- Dr. Durga Poudel, Professor, Environmental Science
- Dr. Carl Richter, Professor, Geology
- Dr. Brian Schubert, Assistant Professor, Geology
- Dr. Natalia Sidorovskaia, Professor, Physics
- Dr. Radhey Srivastava, Professor, Chemistry
- Dr. Jenneke Visser, Associate Professor, Environmental Science
- Dr. Harry Whitlow, Professor, Physics
- Dr. Xu Wu, Associate Professor, Chemistry
- Dr. Hui Yan, Assistant Professor, Chemistry
- Dr. Rui Zhang, Assistant Professor, **Geology/Physics (Interdisciplinary joint faculty hire)**

Project the number of new faculty members needed to initiate the program for each of the first five years. If it will be absorbed in whole or part by current faculty, explain how this will be done. Explain any special needs.

The program will be taught by current faculty.

Describe involvement of faculty – present and projected – in research, extension, and other activities and the relationship of these activities to teaching load. For proposed new faculty, describe qualifications and/or strengths needed.

The Departments/programs in the College of Science at UL Lafayette have in place a highly-structured framework for determining teaching loads, as per research, extension, and other activities. All new faculty who teach at the Graduate level are required to hold a terminal degree, and must demonstrate success in research, teaching, and service.

Scholarly activity within the programs supporting the Ph.D. is high and capable of supporting multiple graduate students. Over the last 6 years, the faculty of the academic units participating in the proposed Ph.D. program published an average of 47 peer-reviewed publications annually (1.67 articles annually per each faculty member). Research activity of these faculty members will increase naturally, as doctoral students join the program and take on dissertation research projects. New, interdisciplinary and collaborative research proposals will be developed by these faculty members as dissertation projects are devised and their doctoral students acquire pilot data. It is anticipated that the successful implementation of the proposed Ph.D. degree program in Earth and Energy Sciences

will significantly enhance research productivity of these faculty, as their doctoral students complete and publish their dissertation research, as external funding supports these research endeavors, and as the doctoral program in Earth and Energy Sciences grows to capacity. We have data from our existing doctoral programs in Mathematics and Environmental and Evolutionary Biology at UL Lafayette that is consistent with this projection that faculty members in Earth and Energy Sciences will increase research activity once the degree program is implemented.

5. Library and Other Special Resources

Are present library holdings in related fields adequate to initiate the program? To meet program needs in the first 5 years, what will be needed? Do other institutions have library resources available to faculty & students for the proposed program?

Present library holdings in the related fields of Geology, Environmental Science, Physics, and Chemistry are adequate to initiate the Ph.D. in Earth and Energy Sciences. The library supports instruction and research with collections in a variety of formats. The library provides electronic access to materials through the library's website.

Other institutions' resources are available to faculty and students for the Ph.D. in Earth and Energy Sciences through Interlibrary Loan and LOUIS: The Louisiana Library Network. The library participates in formal arrangements in order to supplement the collections owned by the library. This includes participation in LOUIS: The Louisiana Library Network, a consortium that allows Louisiana academic libraries to share library resources, collaboratively purchase resources, and extend borrowing privileges across the state. Through the library's membership in LOUIS, students and faculty may obtain a LOUIS card and borrow materials directly at all of the colleges and universities throughout the State of Louisiana.

Indicate/estimate total expenditure for the last two fiscal years in library acquisitions for fields or departments offering or related to the proposed program.

Total Library Expenditures 2016/2017

Print and Electronic Serials Subscriptions: \$1,003,362.17

Online Research Databases (includes LOUIS Consortium Membership): \$972,294.22

Print and Electronic Books: \$56,056.73

Project library expenditures needed for the first 5 years of the program.

No additional library expenditures are anticipated.

What additional special resources, other than library holdings, will be needed?

There are no anticipated additional special resources, other than library holdings, needed.

6. Facilities and Equipment

Describe *existing* facilities (classrooms, labs, offices, etc.) available for the program. Describe present utilization of these facilities that are assigned to the sponsoring department.

The administrative center of the Ph.D. program in Earth and Energy Science will be housed within the School of Geosciences in Hamilton Hall. Faculty meetings related to managing the Earth and Energy Sciences doctoral program will be held in Hamilton Hall. Individual faculty members and their doctoral students may be housed in the School of Geosciences, in the Department of Chemistry, or in the Department of Physics, depending on the primary appointment of the faculty member. In the School of Geosciences located in Hamilton Hall, there are seven classrooms available for lecture classes, totaling almost 7,000 ft² and accommodating 491 students. This space includes a 236-person auditorium, which can be used for large classes and our graduate seminar series. An additional 4,200 ft² of laboratory teaching space is available for "hands-on" laboratory-based courses. Every faculty member and instructor in the School of Geosciences has office space on the 3rd floor of Hamilton Hall. Several additional offices are available to accommodate further expansion. Laboratory research space in Hamilton Hall includes two large (>1,000 sq ft) rooms in the basement (B08/B09). These include extensive bench space, available gas, vacuum and air lines, fume hoods, and wireless internet access. Additional research laboratory space on the 2nd floor is dedicated to geochemical investigations, including isotope ratio mass spectrometry.

Research labs and additional space for graduate students will be provided in the Department of Chemistry and Physics. The Department of Chemistry is located in Montgomery Hall, a two-story building exclusively dedicated to departmental needs with two auditoria, three additional classrooms and seven teaching labs. The chemistry program is accredited by the American Chemical Society and has a full complement of major scientific equipment. In addition, 6,000 ft² of dedicated research space is available to faculty and students, equipped to accommodate research in all major sub-disciplines (analytical, organic, inorganic, polymer, physical). Teaching and research are further supported by two well stocked, fully staffed stockrooms, individual office space for all faculty and a student study lounge.

The Department of Physics is located in Broussard Hall and will offer modern research laboratories to conduct dissertation research and student/faculty office space. Broussard Hall offers over 3,000 ft² of dedicated research space which include fully equipped environmental nuclear physics laboratory, ultrasonic and applied acoustics laboratory, materials research laboratory, underwater acoustics equipment maintenance space (this equipment gets deployed in the field), a fully-equipped machine shop, and the Grant and Melissa Gibson's research laboratory (includes optical and nuclear physics instrumentation for applied research and a 3-D printing station). In addition, the department of Physics leads the operation of the Louisiana Accelerator Center (LAC), 14000 ft² space that houses the low-energy Van de Graff accelerator with three beam lines for material's analysis and microfabrication. Dr. Harry Whitlow, Professor of Physics, serves as the director of this multidisciplinary research center that is utilized by physics, geosciences, biology, chemistry, and engineering faculty.

In summary, more than 21,000 square feet of laboratory, classroom and office space is available for the Ph.D. program in Earth and Energy Sciences with the School of Geosciences and the Departments of Chemistry and Physics. Additional space and resources are available at the University-affiliated Louisiana Accelerator Center.

Describe the need for new facilities (e.g., special buildings, labs, remodeling, construction, equipment), and estimate the cost, proposed sources of funding, and estimated availability for program delivery.

We do not require additional room for research space, classrooms, or faculty and staff offices at this time. We will, however, require additional office space for graduate research assistants and teaching assistants. Therefore, funds are requested in the amount of \$20,000 per academic unit (Geosciences, Chemistry, and Physics) that total \$60,000 in order to remodel space that will accommodate an influx of doctoral graduate students. These funds will create or enlarge shared office space in each academic unit. In addition, \$15,000 is requested to purchase computers to be located in the three graduate student offices. These computers will be shared among the graduate students. The graduate advisory committee, in consultation with the incoming students, will place the students into one of the three graduate student offices. Once the students identify a major professor, they will relocate (if necessary) to the academic unit primarily responsible for that professors' academic appointment. We recognize the importance of teaching assistants holding office hours at a consistent location where students from their courses can come for academic support. It is also important that graduate research assistants have office space located conveniently to the labs where they work so that faculty can appropriately supervise them.

7. Administration

In what department, division, school, college, or center/institute will the proposed program be administered? How will the new program affect the present administrative structure of the institution?

The Ph.D. degree program in Earth and Energy Sciences will be administered by the School of Geosciences, and by the Departments of Chemistry and Physics in the Ray P. Authement College of Sciences. The new program will have little to no impact on the present administrative structure of the institution.

Describe departmental strengths and/or weaknesses and how the proposed program will affect them.

The individual academic units participating in the proposed degree program are the School of Geosciences (with 11 tenure-track faculty); the Department of Chemistry (with 11 tenure-track faculty); and the Department of Physics (with 7 tenure-track faculty). These units are too small individually to support a conventional doctoral program focusing solely on their individual core subject matter. Expanding the size of each of these academic units to permit the development of singularly focused doctoral degree programs would be prohibitively expensive. On the other hand, each of these academic units consists of highly qualified faculty members, each of whom is a highly productive researcher and talented instructor and mentor of students. Data summarizing the research productivity of these faculty members was provided above. The proposed interdisciplinary Ph.D. degree program in Earth and Energy Sciences aims to combine the faculty members of these academic units in such a way that will direct their energy and talents toward a cohesive interdisciplinary mission. That mission will be to prepare interdisciplinary Ph.D. level scientists in Earth and Energy Sciences. The individual teaching loads of the concerned faculty will not substantially increase because the necessary courses will be spread among 29 faculty members, reflecting the sum of the academic units involved. Likewise, the number of new courses needed to implement the degree program will be spread among the academic units, thereby reducing the impact on the individual academic units. Whereas the impact of implementing the proposed degree program on teaching loads will be modest, the impact of implementing the proposed degree program on faculty research productivity will be highly significant. At the present time, none of these academic units has direct access to doctoral students. Thus, implementing the proposed degree program will infuse these academic units with new students eager to learn and then to apply their newly acquired knowledge to their dissertation research. In the short term, implementing the proposed degree program will increase the number and quality of faculty publications and externally funded research grants. In the long term, implementing the proposed doctoral degree program will allow UL Lafayette to build a highly-competitive and well-respected doctoral degree program in Earth and Energy Sciences. This program will enhance the State and the University by attracting significant external funding to enable the acquisition of new scientific infrastructure including state-of-the-art instrumentation, by attracting highly-talented graduate student applicants, and by attracting and retaining highly-talented and dedicated research active faculty members.

In conclusion, implementing the proposed degree program in Earth and Energy Sciences will enable faculty members in Chemistry, Physics, Geology and Environmental Science to maximize their research productivity by enabling them to directly mentor doctoral students and their dissertation research, while, at the same time, not substantially increasing their individual teaching loads. The graduates of this degree program will directly impact some of the most pressing issues facing society, namely how best to acquire energy while at the same time minimizing detrimental impacts of energy acquisition on the environment. Consequently, the University of Louisiana at Lafayette, the State of Louisiana, and the entire nation will benefit from implementing the proposed degree program.

8. Accreditation

Describe plan for achieving *program* accreditation, including: name of accrediting agency, basic requirements for accreditation, how the criteria will be achieved, and projected accreditation date.

There currently is no existing program accreditation body for this discipline.

If a graduate program, describe the use of consultants in developing the proposal, and include a copy of the consultant's report as an appendix.

Consultants were not used for the development of this proposal.

9. Related Fields

Indicate subject matter fields at the institution which are related to, or will support, the proposed program; describe the relationship.

Because the proposed program in Earth and Energy Sciences is interdisciplinary, students with undergraduate degrees in Chemistry, Physics, Biology, Civil Engineering, Environmental Science, and Geology will have the academic

background necessary for admission into the program. Moreover, faculty from these disciplines will be directly involved in our program through research, mentorship, and teaching. We plan to leverage courses that are already being routinely taught, so that changes in teaching loads will be minimal. Faculty from any of these disciplines will be eligible to serve on dissertation committees.

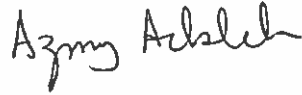
10. Cost & Revenue

Summarize additional costs to offer the program, e.g., additional funds for research needed to support the program; additional faculty, administrative support, and/or travel; student support. How will the program affect the allocation of departmental funds?

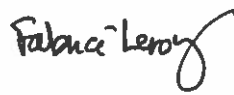
Our proposed program can be fully implemented with limited cost to UL Lafayette. This includes no new funds required for faculty, supplies, operating expenses, or travel. Costs incurred by seven new and continuing graduate assistantships represent a necessary investment in the success of the program. In addition to the seven graduate assistantships requested from UL Lafayette, students will be funded by external research funds and by industry partners, either through the creation of company-sponsored assistantships or corporate funding as a business recruiting tool for graduates. Finally, Ph.D. students will have full access both to the UL Lafayette and the LSU libraries, as well as resources provided through the LOUIS consortium, so little or no additional library costs are anticipated.

*On the separate budget form, estimate new costs and revenues for the projected program for the first four years, indicating need for additional appropriations or investment by the institution.

CERTIFICATIONS:



Dr. Azmy Ackleh, Dean of the Ray P. Authement College of Sciences
Primary Administrator for Proposed Program Date: 1/18/18



Dr. Fabrice Leroy, Assistant Vice President for Academic Programs
On behalf of Provost/Chief Academic Officer Date: 1/18/18

Management Board/System Office

Date

SUMMARY OF ESTIMATED ADDITIONAL COSTS/INCOME FOR PROPOSED PROGRAM

Institution: University of Louisiana at Lafayette

Date: 9/28/17

Degree Program, Unit: Ph.D. in Earth and Energy Sciences

FTE = Full Time Equivalent (use the institution's standard definition and provide that definition).

EXPENDITURES								
INDICATE ACADEMIC YEAR:	FIRST		SECOND		THIRD		FOURTH	
	AMOUNT	FTE	Amount	FT E	AMOUNT	FTE	AMOUNT	FTE
Faculty	\$		\$		\$		\$	
Graduate Assistants (university funded)	\$76,000		\$136,500		\$140,000		\$143,500	
Support Personnel								
Fellowships and Scholarships								
SUB-TOTAL	\$76,000		\$136,500		\$140,000		\$143,500	
	AMOUNT		AMOUNT		AMOUNT		AMOUNT	
Facilities	\$ 60,000		\$		\$		\$	
Equipment	\$18,760		\$2,820					
Travel								
Supplies	400		700		700		700	
Other (specify)								
SUB-TOTAL	\$ 79,160		\$3,520		\$ 700		\$ 700	
TOTAL EXPENSES	\$ 155,160		\$140,520		\$140,700		\$144,200	
REVENUES								
Revenue Anticipated From:	AMOUNT		AMOUNT		AMOUNT		AMOUNT	
*State Appropriations	\$71,658		\$143,317		\$167,203		\$210,198	
*Federal Grants/Contracts								
*State Grants/Contracts								
*Private Grants/Contracts								
Expected Enrollment	5		10		15		18	
Tuition	\$27,553		\$55,106		\$64,290		\$80,822	
Fees (undedicated)	2,203		4,406		5,140		6,462	
*Other (specify)								
TOTAL REVENUES	\$101,414		\$202,829		\$236,633		\$297,482	

* Describe/explain expected sources of funds in proposal text.

**BOARD OF SUPERVISORS FOR THE
UNIVERSITY OF LOUISIANA SYSTEM**

ACADEMIC AND STUDENT AFFAIRS COMMITTEE

February 22, 2018

Item E.3. University of Louisiana at Monroe's request for approval of a Letter of Intent to develop a New Academic Program leading to a Master of Music Education.

EXECUTIVE SUMMARY

The University of Louisiana at Monroe (ULM) requests approval of a Letter of Intent (LoI) to develop a new academic program leading to a Master of Music Education (MME). The purpose of the MME is to develop knowledgeable, skillful, and innovative master music teachers, band directors, and choral directors employed at the secondary and community college levels – people whose students emerge from their experience better-educated and better-prepared for productive futures. To achieve this goal, candidates for the MME will develop deeper content knowledge, improved pedagogical skills, and advanced leadership abilities.

The proposed MME will focus on advanced concepts in music teacher preparation and delivery of instruction. Students will be able to select from two curricular tracks: Choral/General Music and Instrumental. The 36-credit-hour curriculum, which is aligned with National Association of Schools of Music (NASM) requirements, will consist of: 21 credit hours within a major area (choral/general music or instrumental), 10 hours in other music study, and 5 hours for electives. Embedded across the three areas of study (major area, other music study, and electives) are common course hours constructive of the Programs of Studies for each curricular emphasis: Foundations of Music Education, Introduction to Research in Music Education, Teaching Music Students with Special Needs, Applications of Music Technology, Current Topics in Music Education, Music History, and Music Therapy. An independent scholarly study, in lieu of a thesis, will be required and directed by a major professor. The program will be offered as a summer-only program so that teachers can continue in their current positions and progress with the degree; the proposed MME will be obtainable across three summer sessions.

Music teachers, some with multiple years of teaching experience, frequently find it necessary to renew, refine, and discover new techniques for the music classroom or rehearsal and doing this can be difficult while teaching full-time. ULM's proposed summer-only format will allow for teachers to keep their jobs while pursuing the MME. What results from completion of the proposed MME is a master teacher who has a firm grasp of pedagogy required to deliver effective instruction in the music classroom/rehearsal, basically an extension of expertise in skills and knowledge required for music teacher certification within Louisiana schools. The recent movement in education to add an "A" into STEM initiatives, creating STEAM, points to an increasing need for highly qualified arts teachers in public and private schools in the United States. Music and other arts education have long been identified as strong environments for development of problem solving and higher order thinking skills – these are inherent to creating and performing in the arts, and these skills contribute directly to success within other academic

areas. There is a need for a program like the one proposed to be offered within the region and the state. No master's degrees in music are available at any higher education institution in Northeast Louisiana and no Louisiana university offers a Master of Music in Education. The proposed program's summer-only format, designed so that teachers can complete it without interfering with their regular employment, makes the MME even more unique of an offering. During the development phase of the proposed program over twenty (20) choir and band directors from the State indicated an interest in obtaining an MME from ULM. Initial enrollment is projected to be five (5) with that number growing to 20 by YR4.

The proposed MME can be implemented with existing music faculty. Faculty involvement in the course rotations required of the proposed curriculum will be compensated from funds generated by graduate student tuition and fees. As a result, program implementation can occur at no cost to the University. The offering of the proposed program is in line with ULM's role, scope, and mission. In addition, a program like the one proposed will develop master teachers who will enhance the overall educational system of the State of Louisiana. A strong system of education draws new citizens to the state, retains those citizens in the state, and produces the intellectual capacity necessary in an ever-changing technology oriented world.

RECOMMENDATION

It is recommended that the following resolution be adopted:

NOW, THEREFORE, BE IT RESOLVED, that the Board of Supervisors for the University of Louisiana System hereby approves the University of Louisiana at Monroe's request for approval of a Letter of Intent to develop a New Academic Program leading to a Master of Music Education.

University of
LOUISIANA
Monroe

Office of the President

700 University Avenue • Monroe, LA 71209-3000
Phone: 318.342.1010 • Fax: 318.342.1019

E 3

January 29, 2017

Dr. James Henderson, President
University of Louisiana System
1201 North Third Street, Suite 7-300
Baton Rouge, LA 70802

Dear Dr. Henderson:

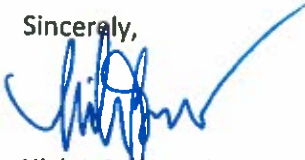
The University of Louisiana Monroe (ULM) respectfully requests approval of its letter of intent to offer a program leading to the Master of Music Education (MME, CIP 13.1312).

I would like to bring the following points regarding the program to your attention.

- This program is consistent with ULM's Role, Scope, and Mission statement as specified in the Louisiana Board of Regents Response to HCR 30 of the 2011 Regular Session of the Louisiana Legislature as follows:
 - Audience: ULM is responsible for serving residents of the northeast region of Louisiana who have completed high school and are seeking either a college degree or continuing professional education. Because the program will be run on-campus, we anticipate that it will enroll students primarily from northeastern Louisiana who are seeking to continue their education.
 - Array of Programs and Services: b. Baccalaureate and master's programs in the professional fields of communications, criminal justice, education, social work, nursing and allied health, and business. This program is classified with CIP designation 13, education.
- There is a need for this program within the region and the state. No master's degrees in music are available at any higher education institution in Northeast Louisiana and no Louisiana college or university offers a Master of Music Education.
- To the best of our knowledge, the program's summer-only format, designed so that teachers can complete it without interfering with their regular employment, is unique within the state.
- Educators with master's degrees are four-star jobs in the Northeast Regional Labor Market (Region 8).

Thank you for consideration of our request.

Sincerely,



Nick J. Bruno, Ph.D.
President

Enclosure

LETTER OF INTENT to DEVELOP a NEW ACADEMIC PROGRAM

General Information

Date: January 17, 2018

Institution: University of Louisiana at Monroe	Requested : Master of Music Education 13.1312
Contact Person & Contact Info: Derle R. Long, School of Visual and Performing Arts, 318-342-3811, long@ulm.edu	

1. Program Objectives and Content

Describe the program concept: purpose and objectives; basic structure and components. Include the draft curriculum.

Purpose and Objectives

ULM proposes a Master of Music Education (MME) whose purpose is to develop knowledgeable, skillful, and innovative master music teachers, band directors, and choral directors employed at the secondary and community college levels—people whose students emerge from their experience better-educated and better-prepared for productive futures. To achieve this goal, candidates for the MME will develop deeper content knowledge, improved pedagogical skills, and advanced leadership abilities.

Basic Structure and Components

The degree will be a summer-only program and will focus on advanced concepts in music teacher preparation and delivery of instruction. The degree will have two curricular tracks available: Choral/General Music and Instrumental. The degree consists of 36 total credit hours and is obtainable across three summer sessions on campus. Course rotations will facilitate completion of the degree within that timeframe.

- Aligning with National Association of Schools of Music (NASM) requirements, the MME curriculum consists of 21 hours within a MAJOR AREA (choral/general music or instrumental), 10 hours in OTHER MUSIC study, and 5 hours for ELECTIVES (see attachments).
- Embedded across these three areas of study (Major Area, Other Music Study, Electives) are common course hours constructive of the Program of Studies for each curricular emphasis: Foundations of Music Education, Introduction to Research in Music Education, Teaching Music Students with Special Needs, Applications of Music Technology, Current Topics in Music Education, Music History, and Music Theory.
- For the choral music curriculum, up to 15 course credits addressing specialty study include: Advanced Choral Methods, Choral Conducting, Choral Literature, Vocal Pedagogy, Diction for Singers, Applied Voice Lessons, and Choir.
- For the instrumental music curriculum, up to 15 course credits addressing specialty study include: Marching Band Teaching and Drill Design (computer assisted), Advanced Techniques in Secondary Instruments (brass, woodwind, percussion), Jazz Ensemble and Improvisation, Instrumental Conducting, Instrumental Literature, and Conducting Practicum.
- The program is offered as a summer-only program so that teachers can continue in their current positions and progress on the degree. The other main concept behind this approach is that face-to-face instruction on campus is the preferred method of becoming a better teacher, preferred over online teaching that offers no opportunities to practice with live subjects.
- A comprehensive examination is required by the graduate committee for each student upon completion of all coursework.
- An independent scholarly study, in lieu of a thesis, is required and directed by a major professor.
- Non-restricted electives include sight-reading, Kodaly/Dalcroze/Eurhythmics methodologies, and other available courses as deemed appropriate by the advisor.
- The course rotations (see below) are designed so that a student may enter the program during any summer session and graduate after the third summer of attendance, upon completing all course requirements and exams. Each student will be expected to complete 12 credit hours from the courses offered each summer. In the first summer, 24 hours of courses will be offered and identified as Rotation I. The second summer will have 17 hours offered as Rotation II. In the third summer, Rotation III and Rotation I will be offered for a combined total of 47 credits. Thereafter, Rotation III will be offered every summer with Rotations I and II scheduled for alternating summers.

*Draft course rotation: * indicates a course common to both tracks xxx indicates a course under development*

Summer I

Intro to Research in Music Education*	MSED 5033	3 credits
Advanced Choral Methods	MSED 5010	3 credits
Conducting Practicum	MUSC 5085	1-3 credit
Teaching Music Students with Special Needs*	MUED 5XXX	2 credits
Applied Voice	MUSC 5041	1 credit
Survey of Diction for Singers	MSED 5088	2 credits
(Elementary: Orff substitution allowed)	MSED 4092	{3 credits}
Marching Band Teaching and Drill Design	MSED 4020	2 credits
Advanced Instrumental Conducting	MUSC 5083	2 credits

Advanced Brass Techniques	MSED 5009	1 credit
<u>Instrumental Literature</u>	MUSC 5015	2 credits
	Totals	24 credits offered
Summer II		
Analysis of Masterworks*	MUSC 5065	3 credits
Advanced Choral Conducting	MUSC 5082	2 credits
Vocal Pedagogy	MSED 5001	2 credits
Applied Voice	MUSC 5041	1 credit
Current Topics in Music Education*	MSED 4011	2 credits
Applications of Music Technology*	MSED 5095	2 credits
Advanced Instrumental Conducting	MUSC 5083	2 credits
Percussion Techniques	MUSC 5011	1 credit
<u>Jazz Techniques/Improvisation</u>	MSED 5XXX	2 credits
	Totals	17 credits offered
Summer III		
Intro to Research in Music Education*	MSED 5033	3 credits
Advanced Choral Methods	MSED 5010	3 credits
Conducting Practicum	MUSC 5085	1-3 credit
Teaching Music Students with Special Needs*	MUED5XXX	2 credits
Applied Voice	MUSC 5041	1 credit
Survey of Diction for Singers	MSED 5088	2 credits
(Elementary: Orff substitution allowed)	MSED 4092	(3 credits)
Marching Band Teaching and Drill Design	MSED 5XXX	2 credits
Advanced Instrumental Conducting	MUSC 5083	2 credits
Advanced Brass Techniques	MSED 5009	1 credit
Instrumental Literature	MUSC 5015	2 credits
Independent Study (non-thesis)*	MUSC 5087	3 credits
Foundations in Music Education*	MUSC 5037	3 credits
Survey of Jazz History*	MUSC 5010	2 credits
Choral Literature	MUSC 4098	2 credits
Comprehensive Exam	MUSC 5XXX	0 credit
Choral Electives:		
Conducting Practicum	MUSC 5085	1-3 credits
Pedagogy Mini-Class	MSED	1 credit
5091, 5092, 5093, 5094		
Sight Reading, Kodaly, Dalcroze, Eurhythmics		
Advanced Woodwind Techniques	MUSC 5007	1 credit
Instrumental Elective		(1-3 credits)
Seminar in Instrumental Music	MSED 5015	(2)
<u>Conducting Practicum</u>	MSED 5085	(1-3)
	Totals	47 credits offered

2. Need

Outline how this program is deemed essential for the wellbeing of the state, region, or academy (e.g., accreditation, contribution to economic development; related to current or evolving needs within state or region). Cite data to support need: employment projections; supply/ demand data appropriate to the discipline and degree level. Also, identify similar programs in the state and explain why the intended one should not be perceived as unnecessary duplication.

Essentiality to Wellbeing of State, Region, or Academy

- Music teachers, some with multiple years of teaching experience, frequently find it necessary to renew, refine, and discover new techniques for the music classroom or rehearsal and doing this can be difficult while teaching full-time. ULM's summer-only format allows teachers to keep their jobs while working on a Master's degree. The face-to-face format is considered superior to online instruction in teacher education. This non-traditional approach was selected to support access for professional improvement and advancement for all music teachers within the state.
- The proposed MME degree is sharply focused on preparing master teachers and professional leaders in a summer-only program. A master teacher is defined as one who has a firm grasp of pedagogy required to deliver effective instruction in the music classroom/rehearsal, basically an extension of expertise in skills and knowledge required for music teacher certification within Louisiana schools. Additionally, master teachers have high expectations of students in their classrooms/ensembles and follow a sequential structure with the ultimate goal of providing students opportunities to experience musical success in these learning environments. A professional leader in music education has a grasp of current trends and is elected or invited to lead professional music organizations at the local level and

upwards to the national level (for example, a ULM alumnus currently serves as national president of the American Choral Directors Association, the premier professional choral organization in the United States.)

- Despite an intensive focus on teacher excellence, the ULM degree is broad enough to provide sufficient training in research methods for graduates to read and assimilate reported findings and thus independently keep current on best practice, a process adopted by most professional associations. Emphasis on pedagogy and teaching excellence allows graduates to focus on K-12 music teacher excellence but does not prohibit continuation into a doctoral program should that become a goal.
- Many school systems, public and private, offer salary incentives for teachers acquiring a Master’s degree.
- A recent movement in education is the addition of an “A” into STEM initiatives, creating STEAM, and points to an increasing need for highly qualified arts teachers in public and private schools in the United States (<https://steamedu.com/about-us/faqs/>). Music and other arts education has long been identified as a strong environment for development of problem solving and higher order thinking skills—these are inherent to creating and performing in the arts, and these skills contribute directly to success within other academic areas. A summer graduate program creating music teacher excellence is an important way to provide quality arts study for teachers within Louisiana schools. In addition to the aesthetic joys of music performance and study, students then can transfer these skills directly into non-arts courses and careers.
- A 2014 study published by the American Association for Engineering Education (Glancy, et al, June 2014) found that essential components of a successful STEM curriculum included teamwork and communications. “Students should have the freedom to think critically, creatively, and innovatively, as well as opportunities to fail and try again in safe environments”, precisely skills that students learn from participation in an arts course such as music. This statement points directly to the need for master music teachers in order to provide the highest quality music education in public and private schools in the State of Louisiana and throughout the country.
- In their book *Becoming Brilliant* (2016), Golinkof and Hirsch-Pasek identified 6 Cs of educating young people in modern schools, those being collaboration, communication, content, critical thinking, creative innovation, and confidence. Again, these are precisely skills that students develop from participation in an arts course such as music with a highly qualified teacher leading the instruction.

Employment Projections and Supply/Demand

- A recent Northeast Regional Labor Market for Area 8 study shows a Four-Star rating for persons working in education with a Master’s degree. (Source: Louisiana Workforce Commission Occupation Proposal for all Occupations to 2020, Regional Labor Market Area 8).
- Postsecondary Art, Drama, and Music Teachers with a master’s degree also show a statewide annual demand for 20 people per year.
- Data available from the Louisiana Board of Regents show an average of 73 MM/MMus graduates per year over the last five years with none coming from a northeastern Louisiana institution; however, many of the institutions offering the degree have multiple concentrations in the MM/MMus so it is difficult to know how many are in music education.

University	5-yr Avg MM/MMus Completers	Total Concentrations	Music Education Concentrations
LSU-BR	38	9	1
Northwestern	7	2	1
Southeastern	8	2	0
ULL	8	5	1
UNO	12	4	0

Program Uniqueness

- A Master’s degree in music is not available at an institution of higher education in Northeast Louisiana.
- No institution of higher education in Louisiana offers a Master of Music Education degree under CIP Code 13.1312 which classifies a degree dedicated to teacher preparation. Analysis of the Master of Music programs currently offered in Louisiana show three have education concentrations. These degrees have specifics in common with the proposed ULM degree:
 1. All require an introductory course in research.
 2. All require a course that addresses current issues and trends in music education
 3. All require one course in music history
 4. All require one course in music theory
 5. All require applied lessons
 6. All require advanced conducting courses or practicum
- No summer-only Master of Music degrees are currently offered in Louisiana. Additionally, further analysis of Master of Music degrees currently offered in Louisiana show them to be research-oriented or a hybrid of research/performance/music education, offered primarily during fall/spring semesters.

3. Relevance

Explain why this program is an institutional priority at this time. How will it (a) further the mission of the institution and (b) increase the educational attainment or quality of life of the people of Louisiana.

Furthering University Mission

ULM seeks students who find value in our programs and prepares them to compete, succeed, and contribute in an ever-changing global society through a transformative education. In contrast to research-focused or hybrid degrees (combination of music, research, and pedagogy) this Master of Music Education degree:

- has as its core mission the creation of Master Teachers and Professional Leaders who will compete, succeed, and contribute in an ever-changing global society.
- will contribute to ULM's excellence in teaching, research, and innovation.
- can position an individual for acceptance into a doctoral program.

It is a priority to ULM because we want to grow our graduate enrollment consistent with a doctoral research institution, because no master's programs in music are available in this portion of the state, and because no MME programs are available anywhere in the state. Master of Music Education candidates will be important contributors to summer music activities on the ULM campus and surrounding region and support goals of increased undergraduate music major enrollment due to the strong relationship created between ULM faculty and graduate student music teachers.

Increasing Educational Attainment or Quality of Life for Louisianians

The development of master teachers in any discipline enhances the overall education system of the State of Louisiana. A strong system of education draws new citizens to the state, retains those citizens in the state, and produces the intellectual capital necessary in an ever-changing technology oriented world.

A strong ULM graduate music education program will produce improved teachers who impact their students, their communities, surrounding communities, the state of Louisiana, and the southeastern region.

4. Students

Summarize student interest/demand for the proposed program.

Over twenty choir and band directors from the State have indicated an interest in obtaining a Master of Music Education degree at ULM. Excerpts of letters from four of those individuals appear below:

To Whom It May Concern:

My name is Katherine Dew and I am a middle school choir teacher in Luling, Louisiana. I am writing to express my interest in obtaining a Master's Degree in Music Education when the program becomes available at ULM. I received my undergraduate degree at Florida State University where I worked very closely with Dr. Bowers. I was delighted when I heard of her new position at ULM and the possible creation of a Master's program under her instruction. If a Master's program in Music Education is created, I will certainly apply for acceptance. Thank you for your time.

Sincerely, *Katherine Dew*

Dr. Bowers,

My name is Chris King and I am the assistant band director at West Ouachita High School. You may remember me sitting across the table from you at the District I Directors' meeting in August.

I am very interested in furthering my education. I have two degrees from ULM, a Bachelor of General Studies (2008) and a Master of Arts in Teaching (2009). I am currently in my 10th year of teaching at the high school and middle school levels. Although the majority of my time at ULM was spent as a Music Education major (percussion), I obviously did not complete that degree plan. Upon graduating with my BGS, I immediately enrolled in the MAT program and began classes while working as a first-year director. My career to this point has been successful; my bands have consistently earned appropriate ratings in the marching and concert idioms; I've worked my way through the ranks, beginning in a rural, high-needs district, to one of the top high schools in one of the top districts in the state; I have also sent many students to college on music scholarships, including some as music majors. What has always bothered me, however, is that I did not complete the BME. I feel as though the MME would correct that. I also feel that it is time for a challenge. After 10 years, I have developed habits, both good and bad. I want to continue to grow as a teacher *and* a student.

What would our next step be? When will the MME program be available at ULM? What are the undergraduate requirements and would I meet them, not having a Bachelor of Music degree?

Thank you and I look forward to hearing back from you! *Chris King*

To Whom It May Concern,

My name is Larry Williams, and I am a band director in Morehouse Parish. The University of Louisiana at Monroe acquiring a Master of Music Education degree is an immensely exciting prospect for myself as well as others like me who desire to further their education. It would be a tremendous boon for ULM and north Louisiana as there are no other options of school for Master of Music Education in the region. One must travel out-of-state (and pay the increased tuition costs) to continue their education, or be content with a Masters of Music with a concentration. Therefore, should the program be approved, I fully intend to obtain this degree.

The faculty members at ULM are all stellar teachers and performers that would insure the highest quality education with a rigorous program. This, in turn, would allow recent graduates of other Louisiana universities to pursue a higher degree without contributing to the "brain drain," seasoned (and rookie) teachers to further their education, and draw in graduates from outside the state. I would highly recommend (and hope) that ULM is approved for this program as it would be a tremendous accomplishment for ULM and the Universities of Louisiana system.

Larry S. Williams

To Whom It May Concern:

I am a graduate from the University of Louisiana at Monroe School of Music. I currently have the Bachelors of Music Concentration in Music Education. During my time at ULM, I had the opportunities to work with professors who are Masters at what they do. The professors at ULM were very supportive of all types of students and learning. This made the learning environment very safe and comforting. There were also numerous opportunities to work in a Master Class and also learn from attending one. I got to participate in an Alexander Technique Master Class and I am currently still utilizing the knowledge from that session. I fully support ULM beginning a Masters in Music Education. With the program being in the summer time, this is ideal for working teachers. We will be able to financially support ourselves and our families throughout the year while continuing to grow our knowledge, ultimately allowing us to become better at what we do. I hope to see this program come to ULM and begin growing our educators, including myself.

Thank you,

Sydney Davis

5. Cost

Estimate new/additional costs of the projected program for the first five years. Indicate amounts to be absorbed out of current sources of revenue and needs for additional appropriations (if any). Commit to provide adequate funding to initiate and sustain the program. On the separate budget form, estimate new costs and revenues for the first four years.

The proposed Master of Music Education degree can be implemented with existing music faculty. Faculty involved in the course rotations will be compensated from funds generated by graduate student tuition and State appropriations at no higher than the maximum rate of \$3,400 for a 3 credit course, \$2,420 for a 2 credit course, and \$1,210 for a one credit course.

Year 1 (summer 2019)

For Rotation I there will be 24 total credits offered at a maximum cost of \$24,720 in stipends for faculty. To start the program, \$5,000 will be required to purchase books, journal subscriptions, music, and other materials as required by faculty. Five graduate students in the program the first summer will generate \$20,800 in tuition. The remaining funds will come from state appropriations of \$10,980.

Year 2 (summer 2020)

During the second summer of the program, Rotation II will be in place offering 17 credits at a maximum cost of \$20,340 in faculty stipends. After the first summer, \$2,500 per year will be required to keep subscriptions and materials current. Five additional graduate students in the program will generate \$41,600 in tuition plus \$21,960 in state appropriations.

Year 3 (summer 2021)

During the third summer of the program, both Rotation III and Rotation I will be offered with 47 total credits available and faculty stipends of \$ 45,810. After the first summer, \$2,500 per year will be required to keep subscriptions and materials current. The addition of five more graduate students into the program (minimum total now of fifteen) will generate \$62,400 in tuition and \$32,940 in state appropriations.

Year 4 and beyond (summer 2022 and beyond)

In subsequent summers, Rotation III will always be offered to allow students to complete the degree. Rotation I and II will be alternated so that students can finish in three summers.

The following simple schematic shows how students will progress through the rotations to completion. The plan assumes a modest enrollment of five students the first summer and increased enrollment of five additional students each summer thereafter. It is believed that actual enrollment will be much higher than five students based on inquiries regarding the program that have been received thus far.

First Summer of Program 2018

Student 1 Rotation 1
 Student 2 Rotation 1
 Student 3 Rotation 1
 Student 4 Rotation 1
 Student 5 Rotation 1

Second Summer of Program 2019

Student 1 Rotation 2
 Student 2 Rotation 2
 Student 3 Rotation 2
 Student 4 Rotation 2
 Student 5 Rotation 2
 Student 6 Rotation 2
 Student 7 Rotation 2
 Student 8 Rotation 2
 Student 9 Rotation 2
 Student 10 Rotation 2

Third Summer of Program 2020

Student 1 Rotation 3 – finished
 Student 2 Rotation 3 – finished
 Student 3 Rotation 3 – finished
 Student 4 Rotation 3 - finished
 Student 5 Rotation 3 – finished
 Student 6 Rotation 1
 Student 7 Rotation 1
 Student 8 Rotation 1
 Student 9 Rotation 1
 Student 10 Rotation 1
 Student 11 Rotation 1
 Student 12 Rotation 1
 Student 13 Rotation 1
 Student 14 Rotation 1
 Student 15 Rotation 1

Fourth Summer of Program 2021

Student 6 Rotation 3 – finished
 Student 7 Rotation 3 – finished
 Student 8 Rotation 3 – finished
 Student 9 Rotation 3 – finished
 Student 10 Rotation 3 - finished
 Student 11 Rotation 2
 Student 12 Rotation 2
 Student 13 Rotation 2
 Student 14 Rotation 2
 Student 15 Rotation 2
 Student 16 Rotation 2
 Student 17 Rotation 2
 Student 18 Rotation 2
 Student 19 Rotation 2
 Student 20 Rotation 2

Program continues past the fourth year following the rotations detailed above.

CERTIFICATION:


 Chief Academic Officer

1-18-18
 Date

 Management Board

 Date of Approval by Board

SUMMARY OF ESTIMATED ADDITIONAL COSTS/INCOME FOR INTENDED PROGRAM

Institution: University of Louisiana at Monroe Date: December 4, 2017

Degree Program, Unit: Master of Music Education, College of Arts, Education, and Sciences

FTE = Full Time Equivalent (use the institution's standard definition and provide that definition).

EXPENDITURES								
INDICATE ACADEMIC YEAR:	FIRST 2019		SECOND 2020		THIRD 2021		FOURTH 2022	
	AMOUNT	FTE	Amount	FTE	AMOUNT	FTE	AMOUNT	FTE
Faculty	\$ 24,720		\$ 20,340		\$ 45,810		\$ 41,430	
Graduate Assistants								
Support Personnel								
Fellowships and Scholarships	0		0		0		0	
SUB-TOTAL	\$ 24,720		\$ 20,340		\$ 45,810		\$ 41,430	
	AMOUNT	AMOUNT	AMOUNT	AMOUNT				
Facilities	\$	\$	\$	\$				
Equipment								
Travel								
Supplies	\$ 5,000	\$ 2,500	\$ 2,500	\$ 2,500				
SUB-TOTAL	\$ 5,000	\$ 2,500	\$ 2,500	\$ 2,500				
TOTAL EXPENSES	\$ 34,720	\$ 25,340	\$ 45,810	\$ 41,430				
REVENUES								
Revenue Anticipated From:	AMOUNT	AMOUNT	AMOUNT	AMOUNT				
*State Appropriations	\$	\$ 10,980	\$ 21,960	\$ 32,940				
*Federal Grants/Contracts								
*State Grants/Contracts								
*Private Grants/Contracts								
Expected Enrollment	5	10	15	20				
Tuition	\$ 20,800	\$ 41,600	\$ 62,400	\$ 83,200				
Fees								
*Other (Rebudgeting)	\$							
TOTAL REVENUES	\$ 20,800	\$ 52,580	\$ 84,360	\$ 116,140				

* Describe/explain expected sources of funds in proposal text.

PROGRAM OF STUDIES FORM

Master of Music Education Degree (Summers Only): Choral/General Track

Degree will appear on final transcript and diploma as:
 Program: Music Education Major: Music Education

Name: _____ Phone: (____) ____ - _____

CWID: _____ Major Professor: _____

Semester Entered: _____ Proposed Semester of Graduation: _____

PLACEMENT EXAM RESULT: Music Theory P / F

Major Area

Semester	Prefix	Number	Title	Credits	Grade
	MSED	5033	Introduction to Research in Music Education	3	
	MSED	5010	Advanced Choral Methods	3	
	MUSC	4098	Choral Literature	2	
	MUSC	5082	Choral Conducting	2	
	MUSC	6087	Independent Study (in lieu of thesis)	3	
	MSED	5088	Survey of Diction for Singers (Orff, general music)	2 (3)	
	MUSC	5001	Vocal Pedagogy	2	
	MUSC	5XXX	Comprehensive Exam	0	
	MUSC	5041	Applied Voice (2 credits across 2 summers)	2	
	MSED	5XXX*	Teaching Music Students with Special Needs	2	
			Minimum Total	21	

Other Studies in Music

Semester	Prefix	Number	Title	Credits	Grade
	MUSC	5010	Survey of Jazz History	2	
	MUSC	5065	Analysis of Masterworks	3	
	MUED	5037	Foundations in Music Education	3	
	MSED	5095	Applications of Music Technology	2	
			Minimum Total	10	

Electives (Offered As Available)

Semester	Prefix	Number	Title	Credits	Grade
	MUSC	5085	Conducting Practicum	1-3	
	MUED	4011	Current Topics in Music Education	2	
	MSED	5091	Pedagogy Mini-Classes: Sight Reading Pedagogy	1	
		5092	Kodaly Techniques	1	
		5093	Dalcroze Techniques	1	
		5094	Eurhythmics Pedagogy	1	
	MUSC	5XXX	Summer Choral Ensemble	1	
			Minimum Total	5	

*NOTE: Music History and Music Theory review courses are remedial and designed to address academic deficits, and they do not fulfill degree requirements under any circumstances. There are no exceptions to this policy.

Major Professor's Signature

Dean or Associate Dean's Signature

Date

Date

- XXX indicates a course under development

PROGRAM OF STUDIES FORM

Master of Music Education Degree (Summers Only): Instrumental

Degree will appear on final transcript and diploma as:
 Program: Music Education Major: Music Education

Name: _____ Phone: (____) ____ - _____

CWID: _____ Major Professor: _____

Semester Entered: _____ Proposed Semester of Graduation: _____

PLACEMENT EXAM RESULT: Music Theory P / F

Major Area

Semester	Prefix	Number	Title	Credits	Grade
	MSED	5033	Introduction to Research in Music Education	3	
	MUSC	5083	Advanced Instrumental Conducting (2 summers)	4	
	MUSC	5015	Instrumental Literature/conducting	2	
	MUSC	5XXX*	Marching Band Teaching and Drill Design	2	
	MUSC	5007	Advanced Woodwind	1	
	MUSC	5009	Advanced Brass Techniques	1	
	MUSC	5011	Advanced Percussion Techniques	1	
	MUSC	6087	Independent Study (in lieu of thesis)	3	
	MSED	5XXX*	Teaching Music Students with Special Needs	2	
	MSED	5XXX	Jazz Ensemble Techniques/Improvisation	2	
	MUSC	5XXX	Comprehensive Exam	0	
			Minimum Total	21	

Other Studies in Music

Semester	Prefix	Number	Title	Credits	Grade
	MUSC	5064	Jazz History	2	
	MUSC	5065	Analysis of Masterworks	3	

	MUED	5037	Foundations in Music Education	3	
	MSED	5095	Applications of Music Technology	2	
			Minimum Total	10	

Electives (Offered As Available)

Semester	Prefix	Number	Title	Credits	Grade
	MUSC	5085	Conducting Practicum	1-3	
	MUED	4011	Current Topics in Music Education	1-3	
	MSED	5091	<u>Pedagogy Mini-Classes:</u> Sight Reading Pedagogy	1	
		5092	Kodaly Techniques	1	
		5093	Dalcroze Techniques	1	
		5094	Eurhythmics	1	
	MUSC	5XXX	Summer Instrument Ensemble	1	
			Minimum Total	5	

*NOTE: Music History and Music Theory review courses are remedial and designed to address academic deficits, and they do not fulfill degree requirements under any circumstances. There are no exceptions to this policy.

Major Professor's Signature

Dean or Associate Dean's Signature

Date

Date

- xxx indicates a course under development

**BOARD OF SUPERVISORS FOR THE
UNIVERSITY OF LOUISIANA SYSTEM**

ACADEMIC AND STUDENT AFFAIRS COMMITTEE

February 22, 2018

- Item E.4.** **University of New Orleans'** request for approval of a Letter of Intent to develop a New Academic Program leading to a Master of Science in Cyber Security and Operations.

EXECUTIVE SUMMARY

The University of New Orleans (UNO) requests approval of a Letter of Intent (LoI) to develop a New Academic Program leading to a Master of Science (MS) in Cyber Security and Operations. Currently, UNO is a National Security Agency (NSA) - designated *Center of Academic Excellence (CAE) in Research*, and a *CAE in Cyber Operations*; the latter is a particular point of distinction since only 20 universities nationwide have achieved such a designation. Likewise, UNO is one of only three institutions to hold such a designation at both the undergraduate and graduate levels. The proposed MS will leverage existing cybersecurity curriculum, infrastructure, and faculty expertise to offer an advanced degree in cyber security and operations with an emphasis on practical, in-demand skills, and advanced understanding of the modern, fast-evolving cyber threat environment. The proposed program will be aligned with the knowledge unit required for the upcoming new designation category of *CAE in Advanced Cyber Operation* in order to further enhance its reputation and national profile.

The proposed graduate program will require 30 credit hours and will have thesis and non-thesis options. In order to enter the program, students must have completed a recognized baccalaureate degree as well as successfully completed the following three courses: Computer Networking, Operating Systems, and Introduction to Cyber Security. The curriculum, as currently designed, has a 15-hour cybersecurity core along with supporting courses, breadth options, special topics, and research-oriented courses for the thesis option. The structure and content of the proposed program is modelled after leading MS programs in cybersecurity (i.e., MS in Information Security at CMU, MS in Cybersecurity at Georgia Tech, etc.) with slight modifications to take advantage of the particular strengths of UNO in cyber operations, reverse engineering and malware analysis, industrial control systems/SCADA security, digital forensics and incident response, and software security. An explicit goal of the proposed curriculum is to align all educational outcomes with the emerging national standards for the cybersecurity workforce – the *NICE Cybersecurity Workforce Framework* developed by the National Institute of Standards and Technology (NIST). What is proposed is a natural progression for UNO since a concentration in *information assurance* at the undergraduate and graduate levels, and the courses required of the MS in Cyber Security and Operations are already in existence. The proposed degree will be relevant to a wider professional audience, including mid-career individuals in need of systemic training in cybersecurity to advance professionally.

There is a well-documented and pervasive shortage of cybersecurity professionals at all levels of industry and government not only in Louisiana but nationally. The Bureau of Labor Statistics projects a growth in *information security analyst* positions of 28% from 2016 to 2026, much faster than the average for all occupations. According to the Louisiana Workforce Commission, *information security analyst* is among the top 10 fastest growing occupations, with a projected statewide growth of 33.8% through 2024, and a median 2016 salary of \$82K; for the Greater New Orleans Area (which is serviced by UNO) the corresponding salary is \$91K with growth projected at 46%. The proposed program responds not only to the needs of the State, but also to the security needs of the nation, which is under constant attack in the cyber domain. In addition, the creation of such a program aligns with UNO's desire to provide talent-laden graduates who not only meet the needs of companies that currently reside in their region but also contribute to bringing new organizations to Louisiana, such as DXC Technology which will establish a 2,000-job Digital Transformation Center in the heart of New Orleans.

The proposed program will target two main streams of potential students – alumni of traditional undergraduate programs in Computer Science (CS) and professionals with non-CS degrees who are currently working in cybersecurity or are seeking a career change. UNO's BS in Computer Science, with nearly 400 majors, will be a primary feeder since the proposed MS will be of interest to those students seeking advanced professional placement as well as providing a bridge to the PhD in Applied and Engineering Science for those seeking a path to a research-focused career in cybersecurity. The ultimate goal is to establish a degree with a national reputation that will draw students from outside of Louisiana. The University projects an initial enrollment of 12 students with enrollment growing to 30 by YR4.

The Department of Computer Science will provide oversight of the proposed program which will be tightly integrated with the existing programs in Computer Science at the graduate and undergraduate levels. The new program will require no new physical infrastructure and will benefit from existing faculty resources. The only additional cost for implementation is the addition of one tenure-track faculty member that will accommodate the increased frequency of graduate course offerings. Cost incurred as a result of a new hire will be offset by tuition and fees.

RECOMMENDATION

It is recommended that the following resolution be adopted:

NOW, THEREFORE, BE IT RESOLVED, that the Board of Supervisors for the University of Louisiana System hereby approves the University of New Orleans' request for approval of a Letter of Intent to develop a New Academic Program leading to a Master of Science in Cyber Security and Operations.



THE UNIVERSITY *of*
NEW ORLEANS

OFFICE OF THE PRESIDENT

January 12, 2018

Dr. Jim Henderson
President
The University of Louisiana System
1201 North Third Street
Baton Rouge, LA 70802

Dear Dr. Henderson,

The University of New Orleans requests approval for a Letter of Intent for a Master of Science in Cyber Security and Operations. The establishment of an M.S. degree in Cyber Security and Operations would leverage over a decade of experience in cybersecurity education and research to develop a program with a national reputation.

Thank you for your consideration of this request. Please do not hesitate to contact me should you have any questions.

Sincerely,

John W. Nicklow
President

LOUISIANA BOARD of REGENTS

LETTER OF INTENT to DEVELOP a NEW ACADEMIC PROGRAM [Oct 2015]

General Information

Date: January 25, 2018

Institution: University of New Orleans	Requested CIP, Designation, Subject/Title: CIP: 11.1003) Computer and Information Systems Security/Information Assurance Designation: Master of Science Subject/Title: Cyber Security and Operations
Contact Person & Contact Info: VASSIL ROUSSEV, Ph.D. Director, Greater New Orleans Center for Information Assurance (GNOCIA) Canizaro-Livingston Endowed Professor in Cybersecurity Professor of Computer Science 332 Mathematics Bldg, University of New Orleans, 2000 Lakeshore Dr., New Orleans, LA 70148 504.280.2405 vassil@cs.uno.edu	

INTRODUCTION: INSTITUTIONAL CONTEXT

The University of New Orleans (UNO) proposes the establishment of an *M.S. degree in Cyber Security and Operations*, which would leverage over a decade of experience in cybersecurity education and research to develop a program with a national reputation.

At present, UNO is an NSA-designated *Center of Academic Excellent (CAE) in Research*, and a *CAE in Cyber Operations*; the latter is a particular point of distinction as only 20 universities have achieved this designation nationwide¹. UNO is one of *only three* institutions to hold it at both the undergraduate and the graduate levels. The proposed degree program will leverage the existing curriculum, infrastructure, and faculty expertise to offer the highest quality educational experience, and a highly respected academic credential. The program will be aligned with the knowledge unit requirements for the upcoming new designation category of *CAE in Advanced Cyber Operations* in order to further enhance its reputation and national profile.

The structure and content of the program is modelled on leading M.S. programs in cybersecurity, such as the M.S. in Information Security at CMU², and the M.S. in Cybersecurity at Georgia Tech³, with adaptations to take advantage of the particular strengths of UNO in cyber operations, reverse engineering and malware analysis, industrial control systems/SCADA security, digital forensics and incident response, and software security.

An explicit goal of the proposed curriculum is to align all educational outcomes with the emerging national standard for the cybersecurity workforce—the *NICE Cybersecurity Workforce Framework*⁴ developed by NIST. The framework defines *categories, specialty areas, work roles, knowledge, skills & abilities (KSAs), tasks, and competencies*, as they relate to the professional requirements of cybersecurity work. As a result, upon graduation, alumni will be demonstrably qualified to fill specific jobs in the workforce.

The program will be hosted by the Greater New Orleans Center for Information Assurance (GNOCIA)—a research center recognized by the LA Board of Regents⁵—which is uniquely positioned to support graduate education. Since its inception in 2009, the GNOCIA has been awarded over \$6.5 million in research grants and contracts, including \$2 million in active current funding, which supports over 15 graduate and undergraduate research assistants, two postdoc/research staff, and one adjunct faculty members.

1. Program Objectives and Content

Describe the program concept: purpose and objectives; basic structure and components/concentrations; etc. Include the draft curriculum.

¹ <https://www.nsa.gov/resources/educators/centers-academic-excellence/cyber-operations/centers.shtm>

² <http://www.ini.cmu.edu/degrees/msis/index.html>

³ <https://www.cc.gatech.edu/master-science-cybersecurity>

⁴ <https://www.nist.gov/itl/applied-cybersecurity/nice/resources/nice-cybersecurity-workforce-framework>

⁵ <http://regents.state.la.us/assets/docs/2015/05/BoR-Approved-Research-Units-included-COE-Apr-2015.pdf>

LOUISIANA BOARD of REGENTS

Purpose:

Leverage UNO's existing cybersecurity curriculum, faculty, and infrastructure to offer an advanced degree in cyber security and operations with an emphasis on practical, in-demand skills, and advanced understanding of the modern, fast-evolving cyber threat environment.

Objectives:

1. Expand UNO's professional degree offerings by providing advanced education in a fast-growing, in-demand area of high relevance to the State of Louisiana, and the nation as a whole.
2. Increase the knowledge, skills, and employability of graduating students by offering them an advanced, employer-relevant credential.
3. Attract professionals already employed in cyber roles for advanced career-enhancing training.
4. Raise the profile of University of New Orleans (UNO) and the Greater New Orleans metro as a national center of advanced cybersecurity expertise.

Structure and Content:

- **HOURS.** The *MASTER OF SCIENCE IN CYBER SECURITY & OPERATIONS* degree, herein referred to as *the degree*, requires a minimum of 30 credit hours, and will have both *thesis* and *non-thesis* options.
- **PREREQUISITES.** In order to enter the program, students must have completed a four-year Baccalaureate degree recognized by the University of New Orleans. Student must have successfully completed the following three UNO courses, or equivalent at another institution: CSCI 4311 Computer Networking, CSCI 4401 Operating Systems, and CSCI 4621 Introduction to Cybersecurity. Students who do not meet the prerequisites can begin their program by taking the corresponding 5000-level section of these courses.
- **CORE REQUIREMENT.** ALL degree students must complete *at least five CORE 6000-level (15 credit hours)* courses in cybersecurity from the ones listed below.
- **SPECIAL TOPICS.** Students may earn up to 6 credit hours (two courses) towards the degree for *CSCI 6620 Special Topic in Cybersecurity* if the topics covered between the two offerings are substantially different. Enrollment in the second topics course must be pre-approved by the Graduate Coordinator for the student to receive credit towards the degree.
- **BREADTH OPTION.** Students can take *up to five 6000-level courses (15 credit hours)* towards satisfying the degree requirements from the 6000-level *BREADTH* courses listed below in the *SYSTEMS* and *ALGORITHMS* categories.
 - If two, or three, breadth courses are taken, then *at least one* of each of the two categories—*SYSTEMS* and *ALGORITHMS*—must be present.
 - If four, or five, breadth courses are taken, then *at least two* of each of the two categories—*SYSTEMS* and *ALGORITHMS*—must be chosen.
- **SUPPORTING COURSES OPTION.** At most 9 credit hours of the 5000-level *SUPPORTING* courses listed below can count towards satisfying the degree requirements. Students who have taken for credit CSCI 4622, CSCI 4623, CSCI 4625, and CSCI 4626 *cannot* take the corresponding 5000-level section for credit towards the degree.
- **THESIS OPTION (RESEARCH TRACK).** The program offers research-oriented MS students to take up the master's thesis option, which entails taking 6 credits of *CSCI 7000 Thesis Research* (at most 3 credits per semester) working with a faculty advisor on a research problem in cybersecurity in lieu of two elective courses; the thesis topic *must be* in cybersecurity.
- **NON-THESIS OPTION (PROFESSIONAL TRACK).** Non-thesis students must complete *at least six CORE 6000-level (18 credit hours)* courses in cybersecurity, as listed below. *CSCI 7000 Thesis Research* cannot be used to satisfy the credit requirements of the non-thesis option.

PREREQUISITES:

CSCI 4311/5311 Computer Networking & Telecommunications	(3 cr)
CSCI 4401/5401 Principles of Operating Systems	(3 cr)
CSCI 4621/5621 Introduction to Cybersecurity	(3 cr)

SUPPORTING courses (5000-level):

CSCI 5622 Reverse Engineering & Malware Analysis	(3 cr)
CSCI 5623 Digital Forensics	(3 cr)
CSCI 5625 Network Operation and Defense	(3 cr)
CSCI 5626 Introduction to Cryptography	(3 cr)

CORE cybersecurity courses (6000-level):

CSCI 6620 Special Topics in Cybersecurity	(3 cr)
CSCI 6621 Advanced Network Security & Operations	(3 cr)
CSCI 6623 Advanced Digital Forensics & Incident Response	(3 cr)

LOUISIANA BOARD of REGENTS

CSCI 6624 Advanced Operating Systems Security	(3 cr)
CSCI 6625 Penetration Testing and Vulnerability Assessment	(3 cr)
CSCI 6626 Advanced Cryptography	(3 cr)
CSCI 6627 Industrial Control Systems Security	(3 cr)
CSCI 6628 Software Security	(3 cr)
CSCI 6629 Programming Language Security	(3 cr)

BREADTH courses (6000-level):

[SYSTEMS] CSCI 6350 Development of Distributed Software	(3 cr)
[SYSTEMS] CSCI 6361 Topics in Mobile Computing	(3 cr)
[SYSTEMS] CSCI 6450 Principles of Distributed Systems	(3 cr)
[SYSTEMS] CSCI 6452 Cloud Computing	(3 cr)
[ALGORITHMS] CSCI 6250 Big Data Analytics and Systems	(3 cr)
[ALGORITHMS] CSCI 6633 Computer Vision	(3 cr)
[ALGORITHMS] CSCI 6634 Data Visualization	(3 cr)
[ALGORITHMS] CSCI 6635 Theory & Computer Applications for Pattern Recognition	(3 cr)
[ALGORITHMS] CSCI 6650 Intelligent Agents and Multi-Agent Systems	(3 cr)

BRIEF COURSE DESCRIPTIONS (cybersecurity courses; semester credit hours each)

CSCI 5621 Introduction to Cybersecurity -- Overview of information assurance; physical security models; authentication and access control mechanisms; application and operating system level security; malicious software; overview of digital forensics; encryption, including private- and public-key encryption methods. A balance between theory and historical/current practice. Students will be required to develop a large project in a team setting.

CSCI 5622 Reverse Engineering & Malware Analysis -- Deep analysis of the code, structure, and functionality of software using both static and dynamic methods. The course provides a solid foundation crucial to understanding modern malicious software and crafting potential solutions to recover from and prevent attacks.

CSCI 5623 Digital Forensics -- An introduction to the theory and application of computer forensics; topics include: types of digital evidence, obfuscation methods used to hide digital evidence, such as steganography and encryption, tools for data preservation and recovery, techniques for ensuring data security, and legal issues in the preservation, recovery, and presentation of digital evidence. The course includes a substantial lab component.

CSCI 5625 Network Operation and Defense -- An introduction to network and system administration with an emphasis on defensive techniques. Topics include processes and files; scripting; system installation; boot and shutdown; process management; daemons and services; devices and drivers; network fundamentals; network file systems; network services; encryption and key management; PKI; intrusion detection; kernel configuration; accounting and system logging; security. The course requires lab projects on dedicated departmental equipment.

CSCI 5626 Introduction to Cryptography -- Elementary ciphers, Data Encryption Standard, Advanced Encryption Standard (Rijndael), Rivest-Adleman-Shamir (RSA) encryption, select topics in modern cryptography. This course contains both programming assignments and proofs as problem options.

CSCI 6620 Special Topics in Cybersecurity -- Advanced graduate-level course whose topics change from semester to semester; can be taken multiple times for credit with department consent.

CSCI 6621 Advanced Network Security & Operations -- Advanced network security and operation, emphasizing the development and application of tools and techniques for securing computer networks and preservation and recovery of digital evidence in networked environments. Topics include: network security concerns, network intrusion detection, honeypots and honeynets, and network forensics analysis. The course includes a substantial lab component.

CSCI 6623 Advanced Digital Forensics & Incident Response -- Advanced digital forensic methods: main memory acquisition and analysis, live forensics, cloud forensics, acquisition and forensic analysis of data from cloud services. Integrity analysis, malware sample extraction from RAM capture, rootkit detection and analysis.

CSCI 6624 Advanced Operating Systems Security -- OS level mechanisms and policies in investigating and defending against real-world attacks on computer systems, such as self-propagating worms, stealthy rootkits and large-scale botnets. OS security techniques, such as authentication, system call monitoring, as well as memory protection will be discussed. Recent advanced techniques such as system-level randomization, hardware/software virtualization, and other hardware features will also be introduced.

CSCI 6625 Penetration Testing and Vulnerability Assessment -- Introduces network penetration testing as a means to continually improve the cyber security mechanisms deployed by an organization. Provides students with hands-on experience with reconnaissance, footprinting, scanning, vulnerability detection, reporting, and remediation techniques employed during a test.

CSCI 6626 Advanced Cryptography -- Modern cryptographic problems, including key management, public-key encryption, knapsack methods, number-theoretic methods, and the RSA public-key cryptosystem, digital signatures, the Digital

LOUISIANA BOARD of REGENTS

Signature Standard, and cryptanalysis of knapsacks; threshold schemes, zero-knowledge protocols, mental poker, and implementations on uniprocessor machines, networks, and parallel machines.

CSCI 6627 Industrial Control Systems Security -- This course introduces the basics of industrial control systems, how their components interact with each other, how they can be programmed, their network protocols, cyber vulnerabilities and threats related to control systems, and how they are tackled in industry.

CSCI 6628 Software Security -- Secure software processes, common software vulnerabilities (input injection, buffer overflow, SQL injection, denial of service), data sensitivity, web security, secure authentication, usable security, secure design, secure coding practices, code review, static analysis, security testing.

CSCI 6629 Programming Language Security -- Programming language security features and, conversely, language features that give rise to vulnerabilities. Topics include the development of secure programs of secure programs in high-level programming languages such as C/C++/Java, programming languages designed from the ground up to support security, and software engineering security principles and patterns.

The proposed curriculum is almost entirely in existence. The only addition is the creation of the CSCI 6620 Special Topics in Cybersecurity course, which is designed to host a rotating cast of advanced topics (typically tied to faculty research). An additional three courses CSCI 6621, 6623, and 6624 will undergo a moderate refresh to better align their content with the new NSA *Advanced Cyber Operation* designation. Some the existing course will be renamed and renumbered in order to achieve the presented streamlined state of the curriculum, which is designed to be easier for students to navigate.

2. Need

Outline how this program is deemed essential for the wellbeing of the state, region, or academy (e.g., accreditation, contribution to economic development; related to current or evolving needs within state or region). Cite data to support need: employment projections; supply/ demand data appropriate to the discipline and degree level. Also, identify similar programs in the state and explain why the intended one should not be perceived as unnecessary duplication.

WORKFORCE NEEDS

There is a well-documented and pervasive shortage of cybersecurity professionals at all levels of industry and government. Nationally, the *existing-jobs-to-open-positions* ratio for all jobs is 5.6; for cybersecurity, it is 2.5 and is considered *very low*⁶. For the State of Louisiana, the ratio is 3.06; for the New Orleans Metro, it is 2.87. Such tight labor markets inevitably result in fast job growth and higher salaries.

According to the Louisiana Workforce Commission, *information security analyst* is among the top 10 fastest growing occupations⁷, with a projected statewide growth of 33.8% through 2024, and a median 2016 salary of \$82,643. For the New Orleans area (RLMA 1), the corresponding median salary is \$91,486 while growth is projected at 46%; for the Baton Rouge area (RLMA 2) the figures are \$87,313 and 42%, respectively. In addition to cybersecurity occupations physically hosted in the State of Louisiana, the advanced training to be provided by the program will open up remote work opportunities for the graduates, which are increasingly common.

According to the Bureau of Labor Statistics, the median annual wage for *information security analysts*⁸ was \$92,600 in May 2016, with the highest 10% earning more than \$147,290. Employment of information security analysts is projected to grow 28% from 2016 to 2026, much faster than the average for all occupations.

The proposed program responds not only to the labor needs of the State, but also to the security needs of the nation, which is under constant attack in the cyber domain. This requires the fast buildup of highly trained professionals, and graduates of the program will make a proud contribution to this national security effort. The program aims to attract professionals from other parts of the country for training and subsequent employment in Louisiana's growing tech sector.

REGIONAL EMPLOYER NEEDS

Between the Greater New Orleans Area (1.5 million; 2016), and the Baton Rouge Metro (830,000; 2016) UNO is perfectly positioned to serve half of Louisiana's population within commute distance, including the main centers of commerce and state, federal, and local government. A substantial number of critical infrastructure installations (such as ports, refineries, pipelines, and power plants) are located in the region. These are an increasingly common target of cyberattacks, with potentially major implications for the safety and wellbeing of Louisiana residents, and appropriately growing cyber workforce needs.

On Nov 13, 2017, Gov. Edwards and Mayor Landrieu announced⁹ that DXC Technology will establish a 2,000-job Digital Transformation Center in the heart of New Orleans. In Louisiana, Virginia-based DXC Technology will pursue a highly integrated model of higher-education workforce solutions to prepare talent for its Digital Transformation Center in New Orleans, where next-generation technology services that support clients' digital transformations will be developed and

⁶ <http://cyberseek.org/heatmap.html>

⁷ http://www.laworks.net/LaborMarketInfo/LMI_OccTopGrowth.asp?years=20152024

⁸ <https://www.bls.gov/oes/computer-and-information-technology/information-security-analysts.htm>

⁹ <http://gov.louisiana.gov/index.cfm/newsroom/detail/1129>

LOUISIANA BOARD OF REGENTS

delivered beginning January 2018. DXC will hire¹⁰ 300 IT and business enterprise professionals during 2018, then ramp up to 2,000 jobs over five years and an annual payroll exceeding \$133 million by 2025.

In addition to the 2,000 new direct jobs, Louisiana Economic Development estimates the project will result in 2,257 new indirect jobs, for a total of more than 4,250 new jobs in the state's Southeast Region. Company officials identified New Orleans as a talent-laden, culturally diverse, high quality-of-life city that would appeal to the technology professionals it will hire for its Digital Transformation Center. DXC serves nearly 6,000 major clients across 70 countries, and the New Orleans center will support a global clientele.

The quality of the Department of Computer Science has been instrumental in convincing GE to create and expand GE Digital – New Orleans (formerly, GE Capital Technology Center - New Orleans). Through the Software Engineering Apprenticeship Program (SWEAP) formed between the Computer Science and GE, some 30 graduates of the program have joined GE as full-time employees. As GE Digital continues to expand into Internet-of-Things (IoT) services, its cybersecurity needs will continue to expand, and will require the advanced skills provided by the program.

Space and Naval Warfare Systems Command (SPAWAR) New Orleans – located next to the UNO main campus — is another employer relying on UNO for its constantly growing needs for trained cybersecurity professionals, and for providing additional training of its current workforce. Historically, a substantial number of graduate students at UNO have come from employees of Lockheed Martin, the US Navy, Naval Research Laboratory, and others, located at Stennis Space Center, which is only 46 mi away from UNO.

GRADUATE PROGRAMS AT OTHER LOUISIANA INSTITUTIONS

Louisiana Tech, LSU, Southern University, ULL, UNO: Master of Science in Computer Science

Several institutions across the state, including UNO, offer a Master's degree in Computer Science. The principal difference between these programs and the proposed one is that they aim to develop advanced (beyond the B.S. level) algorithmic thinking and practical software development skills. The curriculum typically touches upon security topics, but the overall focus is on building a well-rounded software developer, rather than professional cybersecurity expert as aimed by the proposed program.

The UNO program offers a concentration in *Information Assurance*, which is aimed at providing a focus on similar skills as the new program. The experience from operating this concentration, as well as extensive discussions with employers, has informed the need to go further and develop the proposed program as a standalone degree.

LSU Shreveport: Master of Science in Computer Systems Technology¹¹

This is an interdisciplinary program with a computer science core and elements of mathematics, biology, and business. Current concentrations include computer science, biomedical informatics and business administration. This is substantially different from the proposed program, which is entirely focused on building advanced cybersecurity skills.

Louisiana Tech: MBA/Information Assurance Concentration¹²

The degree focuses on business management concerns, and the concentration requires only 6 credit hours of additional work. In contrast, the proposed program allows up to 10 intensive technical cybersecurity courses towards degree completion, and does attempt to build managerial skills.

Northwestern State University: Master of Science in Homeland Security¹³

This program is hosted by the Department of Criminal Justice, History, and Social Sciences, and is primarily designed to train intelligence and counter-terrorism analysts. The vast majority of the curriculum is focused on understanding crime, terrorism, public policy, and legal issues as they related to homeland security; only two course have a more technical focus on cyber security and forensics. In contrast, the proposed program allows up to 10 intensive technical cybersecurity courses towards degree completion.

Tulane University: Master of Professional Studies in Homeland Security Studies¹⁴

This program focuses on practical applications of security and emergency management; it targets forensic accountants, intelligence officers, counterterrorism analysts, security analysts, emergency management specialist, cyber-security managers, and safety managers. The curriculum includes only a single introductory course on cyber threats, unlike the newly proposed program, which focuses on deep technical skills, and not on management.

Louisiana Tech: Master of Science in Cyber Technology¹⁵ [proposed]

¹⁰ <https://louisianajobconnection.com/DXCTechnologyNola>

¹¹ <http://www.lsus.edu/academics/graduate-studies/graduate-programs/master-of-science-in-computer-systems-technology>

¹² <http://www.business.latech.edu/graduate/mba/index.htm>

¹³ <https://www.nsula.edu/ensu/online-programs/master-of-science-in-homeland-security/>

¹⁴ <http://sopa.tulane.edu/degrees-programs/masters-degrees/master-professional-studies-homeland-security-studies>

¹⁵ <http://ulsystem.edu/assets/docs/searchable/meetings/2017/Academic%20and%20Student%20Affairs%20October%202017.pdf>

LOUISIANA BOARD of REGENTS

Based on the Letter of Intent to the UL System Board of Supervisors, the M.S. in Cyber Technology at LaTech is somewhat similar to the M.S. in Cyber Security and Operations proposed by UNO. However, there are several substantive differences which make the two programs quite different in practical terms:

- *Dual tracks.* The UNO program offers two different tracks to its program—research and professional. The research track requires a Master's thesis, and allows for more breadth courses in systems and algorithms; it is designed for students who are interested in research and advanced product development of cybersecurity products, and often continue on to our Ph.D. program. The professional track is designed to maximize practical skill development and is aimed at students interested in directly joining the operational environment, or are working professionals in need of upgrading their skills.
- *Content emphasis.* LaTech's program places a heavy emphasis on forensics, with six of the eleven courses focused exclusively, or primarily, on a variety of forensic analysis techniques. In contrast, UNO's program is focused to a substantial degree on both offensive and defensive cyber operations, with a cluster of five of the courses in that area with little-to-no overlap with LaTech's proposed offerings.
- *Specializations.* UNO has worked hard to develop the expertise and infrastructure to offers a specialized course in Industrial Control Systems Security (directly relevant to critical infrastructure protection in Southeast Louisiana), and we expect to soon be able to offer a follow-up Hardware Reverse Engineering course. Another emphasis is software and programming language security, which aim to build deeper understanding of how to engineer secure software from the ground up. The special topics class, CSCI 6620, provides the means to offer a rotating cast of specialized courses on advanced topics (Hardware Reverse Engineering, Privacy & Anonymity, etc.), and will be one more way to diversify the skill set of our graduates.

Overall, *seven of the nine* 6000-level courses proposed by UNO do not appear to have a direct analog in LaTech's proposed curriculum. This illustrates the fact that the two programs have different histories, target different learning outcomes, and provide different skill sets.

The two programs are also aimed at different, and complimentary, student populations and geographical areas, and cannot be considered duplicative.

Finally, based on the overall demand, which is currently estimated at 1,680 open positions for all of Louisiana⁶ (and expected to grow) even the combined projected output of 70 (Year 4) for the two programs will constitute a small fraction of the openings.

3. Relevance

Explain why this program is an institutional priority at this time. How will it (a) further the mission of the institution and (b) increase the educational attainment or quality of life of the people of Louisiana.

INSTITUTIONAL PRIORITY

The University of New Orleans is a comprehensive urban research university committed to providing educational excellence to a diverse undergraduate and graduate student body. The proposed program completely in line with these strategic priorities, as it strives to accommodate and maximize the benefits to different student populations, while providing them with advanced knowledge and applied skills rooted in faculty research experience and hands-on expertise.

The proposed program is a natural progression of systematic efforts, commenced as early as 2003, to build the University of New Orleans into a center of excellence in cybersecurity. Presently, the Department of Computer Science offers concentrations in *information assurance* at both the B.S. and M.S. level, and the courses referenced in this proposal are in existence and have been part of the regular academic schedule. The proposed degree will make them relevant to a wider professional audience, including mid-career individuals in need of systematic training to in cybersecurity to advance professionally.

By leveraging the expertise, curriculum, and infrastructure developed over the last decade, UNO will be able to cost-efficiently create a program that directly responds to one of the highest areas of highest demand and most acute shortage of professionals with advanced training both within Louisiana and nationwide.

EDUCATIONAL ATTAINMENT AND QUALITY OF LIFE FOR LOUISIANA RESIDENTS

The proposed Master's degree is a carefully considered, forward looking commitment on part of UNO, which seeks to provide new opportunities for educational attainment to Louisiana residents. With approximately half the population of the State within commutable distance, the program would put within their reach the opportunity for advanced education and training in cybersecurity that few institutions around the country can provide.

As the experience with GE Digital in New Orleans shows, technology companies readily respond to the availability of qualified workforce by creating well-paying jobs, which lift the standards of living and have a multiplier effect on the local economy. Other expected benefits include attracting remote work to the area, formation of new enterprises, and attracting highly qualified residents from other parts of the country.

Another broad impact is the increased availability of well-trained cybersecurity professionals, which will improve the security of the cyberinfrastructure of numerous enterprises that are critical to normal life—power grid, water distribution,

LOUISIANA BOARD OF REGENTS

health care, banking, etc. There is every reason to believe that these will be under increasing attack for the foreseeable future, so the prevention of massive security breach will depend on a high-quality cyber workforce.

4. Students

Summarize student interest/demand for the proposed program.

The proposed Master's cybersecurity program seeks to address the interests of both traditional and non-traditional students in the Department of Computer Science. The program will offer two curricular options— research track (thesis option) and professional track (non-thesis). The thesis option is designed for students interested in a career in cybersecurity research, possibly continuing towards a doctoral degree. The non-thesis option is designed to maximize the acquisition of advanced practical skills and a corresponding professional placement in industry, or government.

According to a report by the *Center for Cyber Safety and Education*¹⁶, globally, 87% of cybersecurity worker did *not* start their career in cybersecurity. Of these, in North America, 35% came from non-IT background. These statistics point to a clear need to provide educational options that fit different student populations.

The program will target two main streams of potential candidates— alumni of traditional undergraduate programs in Computer Science (CS), and professionals with non-CS degrees who are currently working in cybersecurity, or are seeking a career change. UNO's B.S. program in Computer Science, with nearly 400 majors, and available concentration in cybersecurity will be a primary feeder, but the ultimate goal is to establish a degree with national reputation.

Unlike traditional M.S. programs in CS, the emphasis of the proposed degree in Cybersecurity will not be the development of advanced programming skills, but on building a deep understanding of the operational cyber threat environment, and the security needs of the modern IT enterprise. As an NSA-designated Center of Academic Excellence in Cyber Operation (one of only 18 nationwide), UNO is perfectly positioned to fulfill this mission. Faculty are highly experienced in working with students from a wide variety of backgrounds, and this experience has informed the development of the presented curriculum.

TRADITIONAL STUDENTS

The new program will provide a natural extension of the existing B.S. in Computer Science program with a concentration in Information Assurance (IA) both for students seeking advanced professional placement, and for those seeking a path to a research-focused career in cybersecurity, providing a bridge to the Ph.D. program in Applied and Engineering Science.

The B.S. program has experienced rapid growth over the last five years, with enrollment *doubling* from 193 in Fall 2012 to 389 in Fall 2017, for an annual growth rate of 15%. There has been a strong and growing interest in the IA concentration with over 14 students signing up for it in the Fall 2017 semester alone.

Assuming a conservative 6% annual growth rate from current level, by Year 4 (AY 21-22) the undergraduate program is expected to reach 500 students. Based on the current number of students, and the ratio of current graduates to enrollment from five years back, we project the B.S. in Computer Science to yield 60 alumni. In addition, we expect some of our M.S. in Computer Science students to opt for a dual major; at present, the program yields 30-35 graduates annually. The two programs should be considered independent (of each other) feeders as less than 10% of the students entering the M.S. program are graduates of the undergraduate program in Computer Science.

NON-TRADITIONAL STUDENTS

As an urban research institution, UNO welcomes and accommodates the diverse backgrounds of all of our students. One student group of particular relevance to this program are veterans who often seek to continue their careers as cyber professionals in the DoD enterprise. They are highly valued as potential employees, and many have the requisite security clearance to immediately work in an operational environment. The University of New Orleans currently enrolls 250 veterans as students and has been recognized as a "Governor's Military and Veteran Friendly Campus"¹⁷.

Through its professional track, the program will actively seek to attract working professional from *SPAWAR New Orleans, Naval Research Lab, US Navy*, large industrial companies like *Shell*, as well as banking and the IT industry, which already hire a significant portion of our graduates.

5. Cost

Estimate new/additional costs of the projected program for the first five years. Indicate amounts to be adsorbed out of current sources of revenue and needs for additional appropriations (if any). Commit to provide adequate funding to initiate and sustain the program. On the separate budget form, estimate new costs and revenues for the first four years.

¹⁶ <https://iamcybersafe.org/wp-content/uploads/2017/07/N-America-GISWS-Report.pdf>

¹⁷ <http://www.uno.edu/news/2015/UniversityofNewOrleansRecognizedforitsServicetoUSMilitaryVeterans.aspx>

LOUISIANA BOARD OF REGENTS

The proposed program will be run by the Department of Computer Science, and will be tightly integrated with the existing programs in Computer Science at the graduate and undergraduate level. Specifically, the new program will require no new physical infrastructure, and will share existing faculty resources.

COST ESTIMATE

The only additional cost anticipated by the introduction of the M.S. in Cybersecurity degree is the addition of one tenure-track faculty member in order to accommodate the increased frequency of graduate course offerings. We estimate the additional load will be equivalent to two courses per semester, or a ½ FTE; the remaining ½ FTE would be in support of the Computer Science degree programs in the department.

Based on recent hiring experience, and on the authoritative *2016 Taulbee Survey*¹⁸, the annual cost of hiring a new tenure-track Assistant Professor is estimated at \$150,000 including full-time salary and mandatory fringe benefits. Fifty percent of the cost is attributed to the new program.

REVENUE ESTIMATE

The expected tuition revenue is calculated based on the official UNO tuition estimate for the next four years, starting in Fall 2018, multiplied by the projected enrollment. The fee revenue is derived from the \$35/credit *differential fee* assessed on all computer science courses at UNO; the calculation assumes 15 credit hours annually.

	YEAR 1		YEAR 3
Tuition:	<u>12</u> x \$7,127 = \$85,520	Tuition:	<u>24</u> x \$8,520 = \$204,480
Fees:	<u>12</u> x 15 cr x \$35 /cr = \$6,300	Fees:	<u>24</u> x 15 cr x \$35 /cr = \$12,600
Total	\$91,820	Total	\$217,080
	YEAR 2		YEAR 4
Tuition:	<u>18</u> x \$7,790 = \$140,220	Tuition:	<u>30</u> x \$9,323 = \$279,700
Fees:	<u>18</u> x 15 cr x \$35 /cr = \$9,450	Fees:	<u>30</u> x 15 cr x \$35 /cr = \$15,750
Total	\$149,670	Total	\$295,450

These projections show that the program requires an enrollment *ten* students to be sustainable, which is expected as soon as the first year. By YEAR 4, the projected enrollment is *three times* the minimum level.

CERTIFICATION:

Chief Academic Officer

Date

Management Board

Date of Approval by Board

¹⁸ <https://cra.org/crn/wp-content/uploads/sites/7/2017/05/2016-Taulbee-Survey.pdf>

LOUISIANA BOARD of REGENTS

SUMMARY OF ESTIMATED ADDITIONAL COSTS/INCOME FOR INTENDED PROGRAM

Institution: University of New Orleans

Date: January 25, 2018

Degree Program, Unit: MS Cybersecurity and Operations

FTE = Full Time Equivalent (use the institution's standard definition and provide that definition).

EXPENDITURES								
INDICATE ACADEMIC YEAR:	FIRST		SECOND		THIRD		FOURTH	
	AMOUNT	FTE	Amount	FTE	AMOUNT	FTE	AMOUNT	FTE
Faculty (1 new)	\$150,000	0.5	\$150,000	0.5	\$150,000	0.5	\$150,000	0.5
Graduate Assistants								
Support Personnel								
Fellowships and Scholarships								
SUB-TOTAL	\$75,000		\$75,000		\$75,000		\$75,000	
	AMOUNT		AMOUNT		AMOUNT		AMOUNT	
Facilities	\$		\$		\$		\$	
Equipment								
Travel								
Supplies								
SUB-TOTAL	\$		\$		\$		\$	
TOTAL EXPENSES	\$		\$		\$		\$	
REVENUES								
Revenue Anticipated From:	AMOUNT		AMOUNT		AMOUNT		AMOUNT	
*State Appropriations	\$		\$		\$		\$	
*Federal Grants/Contracts								
*State Grants/Contracts								
*Private Grants/Contracts								
Expected Enrollment		12		18		24		30
Tuition	\$85,520		\$140,220		\$204,480		\$279,700	
Fees	\$6,300		\$9,450		\$12,600		\$15,750	
*Other (specify)								
TOTAL REVENUES	\$91,820		\$149,670		\$217,080		\$295,450	

* Describe/explain expected sources of funds in proposal text.

**BOARD OF SUPERVISORS FOR THE
UNIVERSITY OF LOUISIANA SYSTEM**

ACADEMIC AND STUDENT AFFAIRS COMMITTEE

February 22, 2018

Item E.5. University of New Orleans' request for approval to award a Doctorate Honoris Causa to Mr. Paul David Hinnenkamp at the Spring Commencement Exercises.

EXECUTIVE SUMMARY

The University of New Orleans (UNO) requests approval to award a Doctorate Honoris Causa to Mr. Paul David Hinnenkamp at the 2018 Spring Commencement Exercises. Mr. Hinnenkamp has had a long and successful career at Entergy Corporation; he joined Entergy in 2001 becoming a Vice President and Officer of the company at the age of 39. Currently serving as Chief Operating Officer and Executive Senior Vice President, Mr. Hinnenkamp is responsible for executive oversight of safety, power generation, transmission, system planning, capital project management, and compliance with North American Electric Reliability Corporation Critical Infrastructure Protection standards. Through his vast knowledge and expertise he created, implemented, and led a \$10B capital plan to improve system reliability, meet increased demand, replace aging infrastructure, and deploy new technologies such as smart meters as part of Entergy's focus to modernize the grid. The efforts made by Mr. Hinnenkamp and his management teams in the past and under his current role have substantially contributed to placing Entergy as one of the cleanest, safest, and most reliable electric utilities in the nation.

In addition to his aforementioned expertise and responsibilities, Mr. Hinnenkamp spent much of his career in nuclear power operations and fulfilled key leadership roles at five (5) different nuclear plants across the country. He received his Senior Reactor Operator license for the Peach Bottom Atomic Power Station from the United States Nuclear Regulatory Commission at the age of 31. Mr. Hinnenkamp earned an MBA from the University of Illinois and a Bachelor of Science in Electrical Engineering from Villanova University. In addition, he completed Harvard University's Negotiations Skills for Executives Program.

Throughout his noteworthy career, Mr. Hinnenkamp has made significant contributions to the energy sector. The University of New Orleans would like to honor Mr. Hinnenkamp for said contributions and bestow a Doctorate Honoris Causa to him at the 2018 Spring Commencement Exercises.

RECOMMENDATION

It is recommended that the following resolution be adopted:

NOW, THEREFORE, BE IT RESOLVED, that the Board of Supervisors for the University of Louisiana System hereby approves the University of New Orleans' request for approval to award a Doctorate Honoris Causa to Mr. Paul David Hinnenkamp at the Spring Commencement Exercises.



E 5

THE UNIVERSITY *of*
NEW ORLEANS

OFFICE OF THE PRESIDENT

December 18, 2017

Dr. Jim Henderson
President
The University of Louisiana System
1201 North Third Street
Baton Rouge, LA 70802

Dear Dr. Henderson,

The University of New Orleans requests approval to award a doctorate Honoris Causa during the University's spring commencement on Friday, May 11, 2018 to Mr. Paul David Hinnenkamp.

Mr. Hinnenkamp holds a Bachelors degree in Electrical Engineering and a Masters degree in Business Administration. He has had a long and successful career at Entergy that includes Executive Vice President and Chief Operating Officer. He has made significant contributions through the energy sector.

Thank you for your consideration of this request. Please do not hesitate to contact me should you have any questions.

Sincerely,

John W. Nicklow
President



THE UNIVERSITY of NEW ORLEANS

COLLEGE OF ENGINEERING

TO: President John Nicklow
THROUGH: Mahyar Amouzegar, Provost
FROM: Emir Jose Macari, Dean of Engineering
DATE: 12/13/2017
RE: Awarding of Doctorate Honoris Causa to Mr. Paul David Hinnenkamp

Dear President Nicklow,

I'm nominating Mr. Paul Hinnenkamp the Chief Operating Officer and the Executive Senior VP of Entergy Corporation for an honorary Doctorate Degree in Engineering for May 2018 Commencement.

Mr. Hinnenkamp has numerous technical and administrative capabilities and at his current role is responsible for executive oversight of safety, power generation, transmission, system planning, capital project management, and compliance with North American Electric Reliability Corporation Critical Infrastructure Protection standards. Paul joined Entergy in 2001 becoming a Vice President and Officer of the company at 39 years of age and continued serving as Vice President and Senior Vice President before becoming EVP and COO.

In reviewing Paul's resume, I have noticed his remarkable involvement with selection of \$90MM and above capital projects. In 2013, Paul was asked to create, implement and lead a new organization to manage, develop, and execute 3-year \$10 B Capital plan to improve system reliability, meet increased demand, replace aging infrastructure, and deploy new technologies such as smart meters as part of Entergy's focus to modernize the grid.

Paul spent much of his career in nuclear power operations and fulfilled key leadership roles at 5 different nuclear plants across the country. He received his Senior Reactor Operator license for the Peach Bottom Atomic Power Station from United States Nuclear Regulatory Commission at the age of 31, MBA degree from University of Illinois, Negotiation Skills for Executives from Harvard University, and Bachelor of Science in Electrical Engineering from Villanova University received in 1983.

Based on discussion held with the leadership of College of Engineering and faculty of the College, I'm happy to confirm that our College recommends that this award be made and it is an honor to participate in the awarding of Honoris Causa degree during the commencement ceremonies in May 2018.



THE UNIVERSITY *of*
NEW ORLEANS

ELECTRICAL ENGINEERING

TO: Emir Jose Macari, Dean of Engineering
FROM: Parviz Rastgoufard, Entergy Endowed Chair for Power Systems Engineering
DATE: 12/13/2017
RE: Awarding of Doctorate Honoris Causa to Mr. Paul David Hinnenkamp

Dear Dean Macari

I'm nominating Mr. Paul David Hinnenkamp the Chief Operating Officer and the Executive Senior VP of Entergy Corporation for an honorary Doctorate Degree in Engineering for May 2018 Commencement.

I have known Paul for several years and have worked with him prior to his role as EVP and COO while he served as the the VP for capital projects overseeing \$30MM and above projects. At his current role of EVP and COO, Paul is responsible for executive oversight of safety, power generation, transmission, system planning, capital projects management, and compliance with North American Electric Reliability Corporation. Entergy operates one of the cleanest generating fleets in US and in 2013 when the CEO of Entergy recognized the significant capital investments that were going to be made, Paul was asked to create, implement, and lead a new organization to manage, develop, and execute projects amounting to \$10 B over a period of 3 years. These projects were targeted for improving system reliability, meeting increased demand, replacing aging infrastructure, and deploying new technologies such as smart meters as part of Entergy's focus to modernize the grid.

In reviewing Paul's resume, I have noticed his remarkable involvement serving as VP of environmental programs and infrastructure for Entergy. In these roles, Paul was responsible for developing generation alternatives for the company's strategic resource plan including renewable energy, nuclear and traditional sources of generation, and leading the effort to deploy carbon capture technology on commercial scale. The efforts made by Paul and his



THE UNIVERSITY *of* NEW ORLEANS

management teams in the past and under his current role have substantially contributed to placing Entergy as one of the cleanest, safe, and reliable electric utilities in the nation.

In addition to his aforementioned expertise and responsibilities, Paul spent much of his career in nuclear power operations and fulfilled key leadership roles at 5 different nuclear plants across the country. He received his Senior Reactor Operator license for the Peach Bottom Atomic Power Station from United States Nuclear Regulatory Commission at the age of 31, MBA degree from University of Illinois, Negotiation Skills for Executives from Harvard University, and Bachelor of Science in Electrical Engineering from Villanova University received in 1983.

I strongly recommend and nominate Paul David Hinnenkamp for receiving honorary Doctorate Degree in Engineering during the commencement in May 2018 and appreciate your support of my nomination. With this memo, I'm sending a copy of Mr. Hinnenkamp's resume for your kind review.

Paul D. Hinnenkamp
203 Walker St.
New Orleans, LA 70124
Email: Hinnenkamp5@bellsouth.net

Current Positions Held

- Director, Entergy Louisiana; Entergy Texas; Entergy Mississippi; Entergy Arkansas; Entergy New Orleans
- Board of Directors, Southeastern Electric Exchange
- Board of Directors, Association of Edison Illuminating Companies
- Board of Directors, UNITY, non-profit focused on eliminating homelessness

Areas of Expertise

- Operations, business development, corporate governance
- Risk management/mitigation
- Management of large capital project programs
- New generation development including new nuclear, gas, and renewable generation and technology innovation
- Crisis readiness/response and Business Continuity

Career History

Entergy Corporation

Executive Vice President & Chief Operating Officer

2015 - Present

Member of the Office of the Chief Executive. Responsible for Safety; \$10B capital project portfolio; Power Generation (excluding nuclear); Transmission; System Planning; NERC/SERC compliance; and Crisis Readiness/Response and Business Continuity programs.

SVP/VP, Capital Project Management

2012 - 2015

Responsible for governance and oversight of all large capital projects for the enterprise; for the development and construction of all new generation; execution of select large capital projects; and technical innovation.

Responsible for Crisis Readiness/Response and Business Continuity programs.

Vice President, Generation Development and Support

2010 – 2012

Responsible for development and construction of all new generation for corporation; strategic asset management of the fossil operating fleet; large capital projects for the fossil fleet; technical support to the fleet; and the close and integration of new plant acquisitions

Vice President, Environmental Programs and Infrastructure

2008 - 2009

Responsible for development of all new generation including nuclear, gas, and renewables; responsible for developing and implementing company strategy regarding renewable generation; responsible for development of key corporate environmental initiatives such as carbon capture and renewable generation.

- Responsible for strategic evaluation of all new generation options including nuclear, gas, biomass, solar, wind, municipal waste, and hydro relative to economics, engineering, construction, and operation
- Key member of team responsible for developing and articulating positions on federal and state legislation regarding climate change and renewable energy policy

Vice President, Business Development, Jackson, MS

2006 – 2008

Responsible executive for the growth of the nuclear business which included development of the new nuclear build option; implementing the growth strategy through acquisitions and development of third party services; obtaining license renewal of the fleet's nuclear assets; and managing an independent company, TLG Services, which focused on decommissioning services.

- Led the development of two (2) new nuclear power plants
 - Accountable to the Office of the Chief Executive
 - Responsible for developing and implementing overall company strategy

- o Responsible for negotiating the Engineering, Procurement, and Construction contracts;

Vice President Operations, River Bend Nuclear Station, LA

2001 – 2006

Responsible for all aspects of plant and personnel performance.

Vice President, Operations Support, Jackson, MS

2001

Responsible for providing support to five nuclear facilities in the areas of Security, Procurement, Licensing, Assessments, and Quality Assurance. Successfully led fleet response through post 9/11 security issues and controls.

Exelon Corporation (previously PECO Energy)

Plant Manager, Clinton Nuclear Power Station, IL

1999 – 2001

Key leader in developing and implementing strategy to obtain approval from the US Nuclear Regulatory Commission to resume plant operations after a nearly 3 year shutdown; implemented necessary changes in leadership, operations, and organizational culture to significantly improve overall facility performance.

Due Diligence Team Member, Chesterbrook, PA

1998 – 1999

Led the due diligence activities for evaluating the acquisition of three nuclear power plants. Responsible for assessing site leadership, business strategy, operations, maintenance, work management, and overall effectiveness of the management of the nuclear power plants.

Plant Manager, Millstone Station, Niantic CT

1996 – 1998

Key leader in developing and implementing strategy to obtain approval from the US Nuclear Regulatory Commission to resume plant operations after a nearly 3 year shutdown; implemented necessary changes in leadership, plant operations, and organizational culture to significantly improve overall facility performance.

Various Management Positions, PECO Energy

1983 – 1996

Held increasing levels of management responsibility gaining experience in operations, maintenance, construction management, project management, and work management. Licensed Senior Reactor Operator.

Previous Positions Held

Member of the Research Advisory Committee (RAC) Executive Committee for the Electric Power Research Institute, EPRI. The RAC provides guidance to EPRI and the EPRI Board on strategy, technology innovation, and technical programs.

Member of the Renewables Executive Advisory Committee for the Electric Power Research Institute, EPRI. The advisory committee's focus is to help the electricity sector develop large-scale & distributed generation technologies, to expand & equip the grid to operate efficiently and reliably with diverse renewable generation sources.

Member of Advisory Board to Clean Power & Energy Research Consortium.

Education

University of Illinois, Champaign IL

Graduate School of Business, Master of Business Administration, May 2002

Villanova University, Villanova PA

School of Engineering, Bachelor of Science, Electrical Engineering, June 1983

Harvard, Boston MS

Negotiation Skills for Executives, Harvard Business School

United States Nuclear Regulatory Commission, Washington DC

Senior Reactor Operator License, US NRC, 1992