Louisiana Board of Regents
2011 Academic Program/Low Completer Review
APPEAL for CONTINUATION of Existing Academic Program

Please submit an electronic copy (email attachment, Word or Word Perfect Document preferred; signed PDF may also be attached) of the completed document to Dr. Karen Denby, Associate Commissioner for Academic Affairs, at karen.denby@la.gov no later than **Monday, February 28, 2011**. Early submission is welcome. All requests for continuation must be submitted through the appropriate system office. Address all 10 issues, but please limit the response to three pages or less. Recommendations to the Board of Regents will be based on this appeal, as well as consideration of the statewide inventory and relevance to institutional role and scope, particularly for graduate-level programs.

General Information **DATE: February 21, 2011**

Campus: Southern University and A&M College in Baton Rouge	Program: Title, CIP, Degree/Certificate Awarded Department of Physics, CIP: 400801, MS Degree Program in Physics

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1. Brief description of the program, including enrollment by year classification, faculty support by type, space/facilities, and administrative support.

Following the rating of excellent for its proposal to establish the Ph.D. degree program in Applied Physics and Materials Science, by consultants hired by the Board of the Regents, Commissioner S. Casper decided not to recommend this program to the Board. He rather selected "to give" us the Master's degree program that was a subprogram of the Ph.D. degree. This occurred in 1996. In the fall of 1996, the MS degree program enrolled its first students. Even though we developed the referenced proposal without any reference to the higher education desegregation, the Regents decided to count the new MS degree program as one of the new programs called for by the desegregation.

The MS degree program at SUBR flourished in its earlier years. In 1998, it graduated up to 11 students. Fifty percent (50%) of the students and graduates were African Americans and mostly Chinese students constituted the other 50%. We had, during these times, graduate assistantships funded by the State, through the Desegregation Agreement. As other Desegregation programs were initiated, the funding for the assistantships dried up. Despite this situation, faculty member stepped up to the plate and secured several graduate assistantships through grants. We presently have over ten (10) such assistantships through mostly federal grants and contracts.

Up to the spring of 2011, we only implemented the standard track of the MS degree program, i.e., one that prepares students to succeed in any Ph.D. degree program, in addition to making research contributions in the high technology industry. Two Black students who earned the MS degree in Physics at SUBR are currently enrolled in the Ph.D. program at LSU. Contingent on final approval of the detailed syllabi, the track for secondary physics teachers is expected to commence in the fall of 2011, with mostly night classes.

Enrollment: Declared Majors	**SPRING 2011 enrollment Data:**					
	FR	SOPH	JR	SR	M/Sp	PhD
	N/Ap	N/Ap	N/Ap	N/Ap	2	N/Ap

Faculty Support of this Major	T	TT	FT	PT	Adjunct	Other
And for service courses	12*				N/Ap	

* Only 12 of the 14 faculty members have physics graduate faculty status (i.e., can teach graduate courses, serve on and chair thesis committees)

Space/facilities; administrative support; etc.

The Department occupies the first floor and most (3/4th) of the second floor in James Hall. It has eight (8) large instructional laboratories, nine (9) research laboratories (medium size), and eighteen (18) offices that just meet its needs. The Department, as of the summer of 2009, has been providing for its administrative support personnel through grants.

2. Projected enrollments (majors) and completers for the next five years with justification for such projections.

2010-11		2011-12		2012-13		2013-14		2014-15	
Enrl	Compl	Enrl	Compl	Enrl	Compl	Enrl	Compl	Enrl	Compl
2	1	6	1	10	5	10	5	10	5

Justification: The current enrollment of two (2) students, who arrived in two consecutive years, explains the completion numbers of one (1) and (1) in 2010-11 and 2011-12. *The major modification we are making to the MS degree program consists of only admitting cohorts of five (5) students or more in any given year.* In other words, if we do not succeed in attracting a cohort of five (5) or more, we will not admit students. However, it should be understood that the MS Degree program will continue to engage several engineering graduate students in its research, as it has done for many years. Additionally, the faculty will be in a position to command research grants and contracts that would not otherwise be awarded to them – irrespective of the excellence of their proposals – as funding agencies associate serious research with graduate programs, and that for good reasons.

What are the chances that we will reach (and most likely surpass) the enrollment target above? The answer is threefold.

(1) With the resumption of the recruitment and mentoring of undergraduate physics majors by the Timbuktu Academy, past data indicate that we will most assuredly produce many more BS degree holders per year, some of whom will enroll in the MS program (either as further a step toward the Ph.D. or further depth acquisition for secondary physics teaching).

(2) The removal of utterly misguided, institutional policies that block the entrance to SUBR for most international or foreign students will afford us the ability to recruit a few international students – in line with globalization trends and for the very enrichment of our African American students. Specifically, these policies have been (a) the very costly (by developing country standards) and time consuming requirement of the review of graduate applications by some commercial entity to "validate" or certify them and (b) the ludicrous requirement of an Internet based Test of English as a Foreign Language (TOEFL) of 77. Brown University, the University of Wisconsin, and several other elite schools require (61), 16 points lower than SUBR's requirement. *These policies are expected to be lifted once and for all by mid-summer 2011.*

(3) The implementation of the Track for Secondary Physics Teachers, planned for fall 2011, is also expected to lead to an increase in enrollment. Incidentally, because of the professionals expected to enroll in this track, our regular MS courses will be moved to the evening. These students will take the same core courses as the current Ph.D. Track students, except that their testing for these courses, including homework assignments, will be concept intensive as opposed to the mathematical sophistication that is needed by the Ph.D. Track students.

3. Contribution to economic health/development of the state.

The contribution of the Department of Physics to the economy of the state of Louisiana cannot be described totally in the few pages that are allowed. Hence, we simply provide bullets that drastically summarize these contributions. Please note that while this report is supposed to be about the MS Degree Program only, a clean division of some contributions between the undergraduate and the graduate programs is difficult.

- Started in the fall of 1996, the MS degree program graduated its first cohort in 1998. As per the data from the Education Division of the American Physical Society, where 1999 is missing, there were 167 MS degrees earned by African Americans in this period of 1998 to 2009 (excluding 1999). During this period (excluding 1999), the MS degree program in Physics at SUBR produced 15 African Americans with the MS degree in Physics, or 3.6% of the national total. **This fact (producing 3.6% of the national total) places the value of our program in the proper and national perspective, given the large numbers of MS granting institutions, including at least four (4) others in Louisiana.** Our total number of MS degrees produced during the indicated period was actually 26 (including the 2 in 1999).

- The research training of graduate students from engineering, chemistry, computer science, and the Ph.D. in Science and Mathematics Education Programs (besides physics) constitutes another unique, economic value of the MS degree program in Physics.

- The Department of Physics has infused significant amounts of funds into the economy of the State of Louisiana. Specifically, from 2005 to 2011, Departmental faculty members acquired **$28,227,198 of which $6,722,000, in grants awarded in 2010, are to be spent from fall 2011 to spring 2015. We should note the very many jobs created because of these grants, the building of the state infrastructure (including $3,948,000 for minority Ph.D. students at LSU, the equipping of SUBR's instructional and research laboratories, and several Million in scholarships to minority students at SUBR and the rest of the state, through the Louis Stokes Louisiana Alliance for Minority Participation). At the web site of the Department (www.phys.subr.edu), we provide a detailed listing of these grants and contracts.** Several of the research grants and contracts (easily identifiable at the web site) would not have been awarded if we did not have an MS Degree program. They include the **$750,000** grant of Dr. Zhao, the **$1,888,198** LASIGMA sub-award of Drs. Bagayoko, Zhao, Henry, Li, and Jana (the last two are in Engineering).

- The production of new knowledge and processes through research is a key contribution of the department to the economic development of the State of Louisiana. In particular, faculty members published 224 research articles reporting their findings. Several of these publications, we should add, literally changed the field in which they were made. Additionally, three of us are members of large international collaborations like IceCube and Auger. *Graduate*

students have significantly contributed to the noted research and results, exactly as they do in elite universities coast to coast. The informed program managers at funding agencies, most of whom have conducted extensive research, know that without graduate students, faculty members have to handle all aspects of the research, including the ones that require no Ph.D. We should add that at least two faculty members are on the threshold of beginning a patenting process for their innovative research work about which I am not liberty to say more. So, we expect much more economic development results than is presently known, over and beyond the millions of dollars noted above, the research training of the technical work force that is expected to go far above the current 9% contribution at the national level for the MS training of African Americans.

4. Uniqueness or relevance to the region or area.

As we noted since 1988, there is "unnecessary duplication" when we have (1) geographic proximity of identical programs, (2) equal or comparable access to these programs (*meaning 2.a same admission criteria, 2.b same or close costs and hence ability of the students to pay, and 3.c same campus atmosphere and probability of having a sense of belonging),* and (3) same student constituents.

The uniqueness and relevance of the MS degree program in Physics is underscored in part by the fact that it produced 9% of MS degrees granted to African Americans, throughout the US, from 1998 to 2009.

During that same period (1998-2009), LSU Baton Rouge produced three (3) minority MS Degree holders; we do not know if any one of them is African American. GSU and SUNO produced no African American MS degree holders (SUNO does not have the MS Program in Physics). ULL, during the same period, produced one (1) minority with the MS degree in Physics; again, we do not know whether that student was Hispanic, Native American, or African American. The point here is to underscore the fact that, in the state of Louisiana, our production of African American MS Degree holders is by far the highest.

In light of the preceding, if policy makers heed the intricacies of higher education when we spell them out, one could easily see a unique feeder role of our MS degree program. One such intricacy is that a large proportion of international students who come to the US to pursue the Ph.D. in science, technology, engineering, and mathematics (STEM) disciplines not only come with a Master's degree, but also with some work experience and more maturity for a good number of them. Unquestionably, unless a very young BS degree holder developed "benign arrogance," she or he could be easily intimidated to the level of dropping out – without most faculty members having a clue as to what happened. The point here is that our MS degree program, partly in light of the preceding, could feed Physics and Astronomy Ph.D. students into LSU, **as it has already started to do successfully**.

The Track in Secondary Physics Education, we believe, will add to the uniqueness and relevance to the MS Degree program in Physics not only for Louisiana, but also for the Nation.

5. Institution's need to maintain this program to support other programs, or to maintain accreditation, or because of (justified, documented) anticipated cost/revenue loss with elimination (e.g., recent major investments, external funding support, tuition, etc).

The revenues loss, in terms of grants, will be in millions of dollars. They are underestimated at $2,000,000 per year. While some of our major grants are for undergraduate mentoring, including research training, several are strictly for graduate level research, with explicit provisions for graduate assistantships.

The MS degree program, unlike the undergraduate one, does not offer extensive instructional support to the rest of the University. As noted above, it does offer significant financial support and research training to graduate students in engineering, computer science, chemistry, and others.

On the instructional front, let us recall that a physics graduate faculty member developed both the proposal and the strategic plan for the Ph.D. degree program in Science and Mathematics Education. Further, a Physics Graduate faculty member directed the dissertation of Dr. Troy D. Williams (who is on the faculty at Southeastern Louisiana University) and is currently directing that of Jake K Yah.

By the very design of the Ph.D. degree program in SMED, the elimination of any of the feeder MS programs is going to handicap this striving Ph.D. program. These feeder MS Programs are the ones in Physics, Chemistry, Mathematics, Computer Science, and Biology.

One critical area where the MS Degree Program in Physics is direly needed by SUBR relates to its upcoming participation in the joint Ph.D. Degree Program in Materials Science and Engineering (MSE). LSU-BR, UNO, and SUBR are the three institutions establishing this program that is a key part of the goals of the $20 Million grant awarded to the State by the National Science Foundation (NSF) in the fall of 2010. All the other participating institutions have graduate degree programs in Physics that are to play key roles in this MSE program. The reasons for this situation are simple: Solid State theory is nothing else but the application of quantum mechanics (of Physics) to the study of condensed matter. Hence, without a significant dose of physics (as provided by

physicists) there cannot be a credible materials science and engineering program. This upcoming program alone should suffice to grant the continuation of the MS degree program in Physics*, inasmuch as that will be pivotal for any meaningful participation of minority students with requisite knowledge of fundamentals to make significant discoveries in materials science and engineering. .*

6. Placement of graduates (positions held, places of employment, enrollment in graduate or baccalaureate study).

2009-10 Graduates	2008-09 Graduates
Chinedu E. Ekuma - Ph.D. Program in Physics, Louisiana State University in Baton Rouge (he entered in the fall of 2010 and passed the qualifying exam in January of 2011)	Sundara Ghatti – Ph.D. program in Science and Mathematics Education, Southern University and A&M in Baton Rouge (SUBR)

7. Passage rate of completers on licensure/certification exams or measures.

Number of Completers	Licensures/Certification Measure	Passage Rate
2009-10:	N/Ap	
2008-09:	N/Ap	
2007-08:	N/Ap	

8. Program quality as reflected by regional or national reputation, faculty qualifications, and the documented achievements of program graduates.

- The only one of the public physics departments commanded by the Board of Regents reviewers in 1996: Their report noted: *"The undergraduate Physics Program at SUBR is among the best we have encountered anywhere … and the vehicle for this has been the altogether remarkable organization, the Timbuktu Academy."*

- The refereed publications of the faculty are a key criterion of the quality of a program in Academia. From 2005 to 2010, the Departmental faculty published 224, mostly refereed publications. The detailed listing of these publications is available at the web site of the Department (www.phys.subr.edu).

- Additionally, several faculty members served (and continue to serve) as referees or on editorial boards of some of the best professional journals in Physics, including Physical Review Letters, Physical Review B, and the journal of the Optical Society of America.

- From 2005 to 2010, faculty members made well over 250 international, national, and local presentations on their findings and on educational and school reforms: 107, 102, 83 State/local, national, and international presentations. The national and international presentations include numerous invited ones.

- The Director of the Timbuktu Academy (a Physics faculty) is a charter recipient of *the US Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring* in 1996. He also received *the 2009 Lifetime Mentor Award from the American Association for the Advancement of Science (AAAS)*. The Timbuktu Academy itself received *the 2002 US Presidential Award for Excellence* and the Academy and its Director jointly received *the 2007 Benjamin Banneker Legacy Award.* These awards are added indications of our quality as recognized across the nation. The MS degree program contributed, even though indirectly, to making the awards after 1998 possible.

9. Other measures of program productivity other than numbers of graduates (grants, publications or other).

As already noted above, we recall the following:

- The refereed publications of the faculty are a key criterion of the quality of a program in Academia. From 2005 to 2010, the Departmental faculty published 224, mostly refereed publications. The detailed listing of these publications is available at the web site of the Department (www.phys.subr.edu).

- From 2005 to 2010, faculty members made 107, 102, and 83 state/local, national, and international presentations, respectively, for a total of 292.

- The Department of Physics has infused significant amounts of funds into the economy of the State of Louisiana. Specifically, from 2005 to 2011, Departmental faculty members acquired **$28,227,198 of which $6,722,000, in grants awarded in 2010, are to be spent from fall 2011 to spring 2015. We should note the very many jobs created because of these grants, the building of the state infrastructure (including $3,948,000 for minority Ph.D. students at LSU, the equipping of SUBR's instructional and research laboratory, and several Million in scholarships to minority students at SUBR and the rest of the state, through the Louis Stokes Louisiana Alliance for Minority Participation). At the web site**

of the Department (www.phys.subr.edu) we provide a detailed listing of these grants and contracts.

10. **Duplication.** In cases where other programs *in the statewide inventory, within the same CIP code and level,* exist, compelling evidence to warrant the continuation of the degree program at this institution. Address plans and efforts toward collaboration or sharing resources with other, similar programs in the state or region, new delivery mechanisms, etc.

The uniqueness of this program stems from the fact that while LSU's Department of Physics and Astronomy is about 10 miles away and that it is doing a great job with its research mission, undergraduate and graduate teaching, and service, from 1998 to 2009, it only produced *three (3)* minority BS degree holders in Physics – according to certified data from the Board of Regents. During the same period, ULL produced *One (1)* minority with the MS in Physics. We do not know if any one of these students is African American. During the same period, the Physics Department at SUBR produced *fifteen (15)* African American MS degree holders in Physics.

Clearly, there is no such a thing as unnecessary duplication. As we noted since 1988, there is "unnecessary duplication" when we have (1) geographic proximity of identical programs, (2) equal or comparable access to these programs (*meaning 2.a same admission criteria, 2.b same or close costs and hence ability of the students to pay, and 3.c same campus atmosphere and probability of having a sense of belonging),* and (3) same student constituents [ethnicity, gender, and otherwise).

If anything, We see the MS degree program as enabling our research to the point of meaningfully collaborating with LSU and others in the state [as illustrated by our participation in the noted $20,000,000 grant of which we get just a little less than 10%). The feeder role the MS program has successfully played for LSU is expected to grow much further.

Other Information

Present any other significantly pertinent information that has not been requested.

A 1992 study of the University showed that the Department of Physics generated, in student credit hours (SCHs) $200,000 more than was spent on the Department. This occurred before the Timbuktu Academy's impact led to a jump in the enrollment of majors to over 60. It was below 20 at the time. While the exact amount of this surplus is not known today, a surplus does exist, as per the SCH production data. *In light of this fact, cost considerations should not lead to a termination of the MS Degree program, given its unique role and its productivity (grants, publications, presentations, and the granting of 10% of MS degrees earned by African Americans in the US, from 1998 to 2009).*

While we have not discussed it before, SUBR is likely to suffer seriously if it loses the significant overhead associated with the many research grants of the Department of Physics. When this overhead (or indirect costs) is factored into the cost equation, than the Department of Physics literally goes further in the black (i.e., far away from the red of a deficit). This fact supports the assertion in the preceding paragraph.

A fact not known to those outside the Department and that buttresses the above assertion consists of the fact that close of half of our MS courses are taught free of charge by the faculty! Only the five (5) core courses, for a total of 15 credit hours out of the total of 30, are routinely counted in the teaching load of faculty members. As for the several research courses, faculty members do not generally get teaching credits for them.

This State led the country when it initiated the Joint Faculty Appointment Program (JFAP) in the 1990s. And the Department of Physics and Astronomy, at LSU, and the Department of Physics, at SUBR, were the very first to have jointly appointed faculty members. These two (2) faculty members are consummate researchers. Again, the collaboration between our two departments is real and growing. The elimination of the MS Degree Program in Physics places the jointly appointed faculty members in a predicament while it handicaps the overall collaboration in Physics and Astronomy between LSU and SUBR.