

WHALIN, JSU
DHS Coastal Resilience Center
Education Project
Annual Project Performance Report

Covers reporting period January 1, 2016 – June 30, 2016

1. **Project Title:** PhD in Engineering (Coastal Engineering and Computational Engineering concentrations) at an HBCU.
2. **Principal Investigator / Institution:** Robert W. Whalin, Ph.D., P.E., D.CE; Professor of Civil Engineering; Education Director, Coastal Resilience Center of Excellence, Jackson State University
3. **Other Education Participants/Partners:** US Army Engineer Research and Development Center, University of North Florida and Texas A&M University at Galveston
4. **Short Project Description (“elevator speech”):** This project establishes the first HBCU PhD in engineering degree with concentrations focusing on coastal natural disasters. It will help increase workforce diversity (over 80% of students are minorities) in the Homeland Security enterprise. The PhD Engineering degree will have two coastal natural disaster related concentrations: Coastal Engineering (focusing on hurricanes and floods) and Computational Engineering (focusing on computational fluid dynamics) and continues to nurture the BS/MS education programs resulting from the Coastal Hazards Center of Excellence (July 1, 2008-June 30, 2016). End user (employer) relationships with ERDC, MDOT, Corps of Engineers Districts, MEMA and local emergency management offices across the southeastern US are promulgated.
5. **Abstract:** This project will formulate and implement a concentration in Coastal Engineering for the PhD Engineering degree and will promote the approved Computational Engineering concentration. These two PhD concentrations have a pipeline of BS Civil Engineering (Coastal Engineering Track) and MS Engineering (Coastal Engineering and Computational Engineering concentrations) graduates plus government and industry employees within the commuting area as a steady source of students. The BS and MS programs were formulated and implemented during the DHS Coastal Hazards Center of Excellence (July 1, 2008-June 30, 2016) at Jackson State University and form an academic foundation for the CRC. These are the only natural disaster focused coastal engineering and computational engineering graduate (or undergraduate) programs at an HBCU and are a direct result of DHS Office of University programs support for Centers of Excellence. Jackson State University has a minority student population exceeding 80% which directly supports the DHS

Strategic Plan Goal to Enhance the DHS Workforce, especially the Objective to Increase Workforce Diversity and Priority Goal 3 to Enhance Resilience to Disasters. Leverage of federal assets is assured by the Education Partnership Agreement (authorized by Public Law) between the Engineer Research and Development Center and Jackson State University that facilitates ERDC engineers serving as Adjunct Faculty, providing student internships and potential use of ERDC experimental and computational facilities for graduate research. An outstanding record of DHS End User involvement and transition of graduates to end users was established during the eight years of the Coastal Hazards Center of Excellence at Jackson State University and will be strengthened by the five year Coastal Resilience Center. Research staff and graduate students have direct participation in hurricane barrier projects including the Ike Dike concept for protecting Galveston Island and the greater Houston metropolitan area from devastating, hurricane surges. Coastal Engineering programs nationwide have been on a decline for the past two decades and United States leadership in the coastal engineering profession has declined relative to other nations. This project will help ameliorate the trend while increasing the supply of minority coastal and computational graduate level engineers.

- 6. End users:** The following table is a partial list of end users and their role in this education project: The only change from the original submission is the last line (an addition).

End User	Agency/Employer	Project Role
Emergency Management Institute (EMI)	DHS	Potential user of CRC education project courses for first responders and others.
Staff	FEMA Region IV	Transition, employer
Leaders Mississippi Emergency Management Agency	MEMA	Transition, potential employer of graduates, collaborator; a source for graduate students.
Free Flow Power Development, LLC	Free Flow Power	Collaborator (guest lecturer), Transition (helps students with internships/employment).
GIS Specialist	MEMA	Collaborator, Transition (employer and co-author).
Assistant Professor USCG Academy	USCG Academy	Collaborator, potential co-author & intern employer
Branch Chief, MVX Vicksburg District	USACE	Transition (employer)
Senior Association Coordinator	Louisiana Emergency Preparedness Association	Collaborator (potential employer).
Vice President	SDW	Transition employer
Commander Vice Commandant Office	USCG	Collaborator, coordinator with Commandant Office
President	Pritchett Engineering and Planning, LLC	Transition, employer of interns and graduates.
	Neel-Shafer, Inc.	Transition, employ student interns and graduates.

Leadership Team Member	Director, ERDC	Transition, signatory for ERDC Education Partnership Agreement with Jackson State University
Director Emeritus, ERDC	Retired, ERDC	Member of CRC Advisory Board and Collaborator.
Director, Coastal and Hydraulics Laboratory (CHL)	ERDC	Transition; CHL is employer of interns and graduates. CHL is source of Adjunct faculty & graduate students
Director, Information Technology Laboratory (ITL)	ERDC	Transition; ITL employs interns & graduates. Approver for Computational assets/use
Director, Geotechnical and Structures Laboratory (GSL)	ERDC	Transition; GSL employs interns & graduates.
Director of Human Capital	ERDC	Transition, Key person in strategic recruitment
Research Engineer, CHL	ERDC	Adjunct Professor, graduate Coastal Engineering courses.
Research Scientist, CHL	ERDC	Undergraduate Adjunct Professor.
Division Chief, CHL	ERDC	Collaboration/advisor & transition employer
Technical Director, CHL	ERDC	Guest lecturer (graduate)

- 7. Explanation of Changes:** There are no Year 2 activity or milestone changes from the original approved workplan.
- 8. Unanticipated Problems:** No challenges were encountered that impacted progress or Year 2 activities or milestones
- 9. Project Outcomes: End User/Transition Outcomes -** Specific end-user outcomes from this new PhD Engineering program (Coastal Engineering concentration) are graduates available for employment in the greater Homeland Security enterprise. Graduation from a PhD program is nominally four to five years and at best some three to four years after completion of MS degree requirements. It requires approximately twelve to eighteen months for program approval within the university, consequently the first graduates from this program are expected at or near the end of year five with an established pipeline of 1-3 PhD graduates per year anticipated. The second end-user outcome is to continue to produce BS/MS coastal and computational engineering graduates resulting from Program 1 of the CHC. These Coastal and Computational Engineering programs are unique to the HBCU academic community. Transition Activities and Milestone progress are documented in item 11 of this progress report. All original Year 2 and beyond milestones are intact as originally scheduled.

1/1/2016-6/30/2016	
<u>Transition Activity</u>	<u>Completion Date</u>
1. Continued enrollment of students in BS/MS programs	06/30/2016
<u>Transition Milestone</u>	
1. Graduation of BS/MS students and employment in greater HS enterprise or continued graduate school enrollment.	06/30/2016
7/1/2016-6/30/2017	
<u>Transition Activity</u>	<u>Completion Date</u>
1. Continued enrollment of students in BS/MS programs	06/30/2017
<u>Transition Milestone</u>	
1. Graduation of BS/MS students and employment in greater HS enterprise or continued graduate school enrollment	06/30/2017
7/1/2017-6/30/2018	
<u>Transition Activity</u>	<u>Completion Date</u>
1. Continued enrollment of students in BS/MS programs	06/30/2018
2. Enrollment of students in approved PhD concentration	06/30/2018
<u>Transition Milestone</u>	
1. Graduation of BS/MS students and employment in the greater HS enterprise or continued graduate school enrollment.	06/30/2018

Progress toward the outcomes was steady and consistent. Two May 2016 BS graduates (who had taken undergraduate coastal engineering courses) and one May 2015 BS graduate applied for acceptance to graduate school, were accepted and are enrolled in courses for fall 2016 (Year 2). I am their advisor and they are committed to the Coastal Engineering concentration of the MS Engineering degree program (one with plans to enroll in the PhD Engineering degree program upon approval of the Coastal Engineering concentration). Three other graduate students continued progress toward a MS Engineering degree with a Coastal Engineering concentration (two are projected to graduate during Year 2 and one is projected to graduate during Year 3). The two students projected to graduate during Year 2 with MS degrees have expressed a desire to enroll in the PhD Engineering degree program (upon approval of the Coastal Engineering concentration). The PI is very pleased with the Year 1 Transition Activity and Milestone accomplishments described in item 11.

10. Education Activity and Milestone Progress: Formulation (draft) of the PhD Engineering program was completed and it is undergoing peer review and will continue to do so until the documentation is formally submitted for approval (scheduled 12/30/16). Recruitment of Adjunct Professors is a continuous process. Verbal commitments were received from two potential PhD adjunct professors and others have indicated a definite interest in completing the application package to be considered. During the reporting period a robust number of graduate courses were taught (three regular graduate courses and four different Independent Study courses. Two BS degrees were awarded and two MS degrees are scheduled Year 2.

Education Activities and Milestones: Progress to Date

Reporting Period 1/1/2016 – 6/30/2016			
Education Activity	Proposed Completion Date	% Complete	Explanation of why activity / milestone was not reached
Formulate Coastal Engineering concentration	4/30/16	100%	-
<i>Continue to Recruit Adjunct Professors</i>	5/30/16	100%	<i>This activity should have been worded as continue to.... Since it is a continuous activity. When correctly worded, as modified; it was 100% completed.</i>
Seek peer review of PhD program formulation	6/30/16 12/20/16 <i>New completion date</i>	90%	Upon assessment of this activity, it was decided it was more beneficial to continue peer review until completion of preparation of Coastal Engineering concentration documentation scheduled for 12/30/16 since peer review could be incorporated into program formulation until it is submitted for approval. This activity completion date change has no impact on completion of original Year 2 activities or milestones.
Continue to teach BS/MS classes	6/30/16	100%	-
Education Milestone			
Continue to graduate students enrolling in BS/MS Coastal Engineering	5/30/16	100%	-
Submit Adjunct Professor documentation for approval	6/30/16 10/30/16 <i>New completion date</i>	60%	Additional adjunct professors, based on the original schedule, are not needed until Fall 2017 (Year 3), at the earliest, therefore it was decided to modify this milestone completion date to 10/30/16 in order to collect as many potential adjunct professor applications as possible. A seminar was scheduled at ERDC for July 2016 to present the draft PhD program formulation and to seek additional adjunct professors. Expectations are that at least three PhD research engineers will express an interest and submit an application to be an Adjunct Professor. This 4 month milestone increase has no impact on completion of the original Year 2 Activities and Milestones.

11. Transition Activity and Milestone Progress:

Enrollment of students the BS/MS coastal engineering related courses continued. Two enrolled BS students graduated and two of three enrolled MS students are scheduled to graduate during Year 2 (Dec. 2016 and May 2017). The two BS graduates are both enrolled in graduate school for Fall 2016. One has a summer 2016 internship at University of Indiana and the other has an internship in private industry in Homeland Security enterprise firm.

Transition Activities and Milestones: Progress to Date

Reporting Period 1/1/2016 – 6/30/2016			
Transition Activity	Proposed Completion Date	% Complete	Explanation of why activity / milestone was not reached
Continued enrollment of students in BS/MS program	6/30/16	100%	
Transition Milestone			
Graduation of BS/MS students and employment in the greater HS enterprise continued graduate school enrollment	6/30/16	100%	

12. Interactions with research projects: Planning and coordination discussions were held in Vicksburg, MS with Dr. Don Resio, University of North Florida and one of his graduate students relative to JSU participation/in his research project. Dr. Casey Dietrich, North Carolina State University gave an outstanding seminar, “Hurricane Wave and Storm Surge Forecasting for the North Carolina Coast” on May 4, 2016 attended by about 30 professors and students.

13. Publications: The first publication below was Co-authored by another CRC PI (Professor Ismael Pagan) and by two of our ERDC partners. Professor Pagan participated in presentation of the paper with me at the ASEE Annual Conference.

Whalin, Robert, W.; *Trinidad, Ismael Pagan;* Villanueva, Evelyn; and Pittman, David, “A Quarter Century of Resounding Success for a University/Federal Laboratory Partnership”, ASEE 123rd Annual Conference and Exposition, New Orleans, LA, June 26, 2016

Whalin, Robert, W.; “HBCU Engineering Faculty and Graduates: Implications for Race, Retention and Graduation Linkages”, NAAAS & Affiliates 2016 National Conference, Baton, Rouge, LA, February 2016

14. Leveraged resources: Leveraged resources from Texas A&M University, Galveston NSF PIRE Project entitled, “Coastal Flood Risk Reduction Program” (\$71,914) year one funding of \$71,914. These funds provided monthly stipends for graduate students and the project enabled them to travel to The Netherlands for ten days in late May 2016 to gather data, view flood protection projects and speak extensively with Dutch professors and graduate students about individual research project information to comprise the basis for 3 semester hour summer Independent Research Projects under my direction. This was an outstanding and highly unusual international research experience for the students. The CRC staff also are performing research for this TAMU,G PIRE project with ERDC partners and have benefitted by nominally 600,000 cpu hours of supercomputer usage that has an estimated leveraged value of about \$ 36,000 [@ \$0.06/hour].

15. Anticipated / proposed future work: This PhD in Engineering (Coastal Engineering and Computational Engineering concentrations) at an HBCU cannot realize its proposed output unless extended thru the five years of the CRC as awarded. PhD programs nominally take 4 to 5 years of graduate work and research to produce a PhD. The first PhD graduate is expected at or near the end of CRC Year 5 with an established pipeline of 1-3 PhD graduate yearly as originally proposed. Education projects nominally require at least five years to realize institutionalized productivity. We fully expect to realize the productivity proposed and are on schedule to do so.

16. CRC Performance Metrics: The following two pages contain performance metrics.

CRC Performance Metrics			
Metric	Research	Education	Center
Courses/certificates developed, taught, and/or modified		See Table	
Enrollments in Center-supported courses/certificates			
HS-related internships (number)		5	
Undergraduates provided tuition/fee support (number)		1	
Undergraduate students provided stipends (number)		0	
Graduate students provided tuition/fee support (number)		4	
Graduate students provided stipends (number)		2	
Undergraduates who received HS-related degrees		2	
Graduate students who received HS-related degrees		0	
Certificates awarded (number)		0	
Graduates who obtained HS-related employment		1	
SUMREX program students hosted (number)			
Lectures/presentations/seminars at Center partners		1	
DHS MSI Summer Research Teams hosted (number)		0	
Journal articles submitted (number) (includes peer reviewed conference proceeding)		2	
Journal articles published (number) (includes peer reviewed conference proceeding)		2	
Conference presentations made (number)		2	
Other presentations, interviews, etc. (number)		5	
Patent applications filed (number)			
Patents awarded (number)			
Trademarks/copyrights filed (number)		0	
Requests for assistance/advice from DHS agencies		0	
Requests for assistance/advice from other Federal agencies or state/local governments (number)		0	
Total milestones for reporting period (number)		3	
Accomplished fully (number)		2	
Accomplished partially (number)		1	
Not accomplished (number)		0	
Product/s delivered to end-user/s (description and recipients)	See Table		
External funding received	See Table		
Leveraged support			
Articles on Center-related work published on website			
Coverage in media, blogs (number)			
Social media followers (number)			
Posts to social media accounts (number)			
Events hosted (number)			
Website hits (number)			

Courses Developed and Taught by Jackson State University under Project PhD in Engineering (Coastal Engineering and Computational Engineering concentration) at an HBCU						
Course		Developed (D), Revised (R), and/or Taught (T), by Project Year				
Number	Title	1	2	3	4	5
CIV631	Linear Theory of Ocean Waves	T				
	Offering: Elective (E), Concentration (C), Minor (M)	C				
	Enrollment	6				
CIV637	Advanced Design for Breakwater Rehabilitation	T				
	Offering: Elective (E), Concentration (C), Minor (M)	C				
	Enrollment	3				
CIV642	Prestressed Concrete Design	T				
	Offering: Elective (E), Concentration (C), Minor (M)	E				
	Enrollment	4				
CIV698	Independent Study (4 separate courses)	R/T				
	Offering: Elective (E), Concentration (C), Minor (M)	C				
	Enrollment	1				
Graduate courses are 500 and 600 level						

Table for Documenting External Funding and Leveraged Support

External Funding			
Title	PI	Total Amount	Source
Coastal Flood Risk Reduction Program	Robert W. Whalin	\$71,914	Texas A&M University, Galveston (NSF PIRE)
Leveraged Support			
Description			Estimated Year 1
High Performance Computer use (at ERDC partner)			\$36,000