BOARD OF REGENTS

SUMMARY OF ITEM FOR ACTION,
INFORMATION OR DISCUSSION

TOPIC: University of Maryland Eastern Shore: Professional Science Master's (PSM) in Quantitative Fisheries and Resource Economics

COMMITTEE: Education Policy

DATE OF COMMITTEE MEETING: June 2, 2010

SUMMARY: Professional Science Master's degree programs provide an alternate professional career path for bachelor's degree holders in the STEM disciplines to help meet staff needs of industries, consulting firms and governmental agencies, and have been endorsed by the National Research Council (NRC 2008). Addressing the shortage in the number of stock assessment scientists will require the development of innovative programs such as the one proposed to attract students with quantitative backgrounds into fisheries science; a modification of fisheries science curricula at U.S. institutions; and the design and delivery of on-line courses and short courses that will be accessible to students. In addition to training and graduating Ph.D. level holders in quantitative fisheries and resource economics to lead innovative research endeavors, there is a need for individuals in these areas who are well trained not only in the technical subject matter, but also in management, leadership and communication skills. This is the basis upon which the university proposes to establish a PSM degree program with concentrations in quantitative fisheries and resource economics. Graduates of this program will assume intermediate level staff positions that will provide the needed analytical support to Ph.D. scientists in the area, especially those working in state and federal agencies such as NOAA NMFS.

Nationally, there are 11 PSM degree programs in the area of Environmental Science and Management, however no PSM program exists in quantitative fisheries science and resource economics, making the proposed degree program novel. A search of the MHEC program inventory revealed that there were no programs in Quantitative Fisheries and Resource Economics offered at any degree level at any higher educational institution in the state. It is anticipated that individuals who have completed bachelor's degrees in biological sciences including marine and environmental science, economics, mathematical and agricultural sciences will be among those who will be attracted to the program. The program will also target employees of federal, and state agencies who may need additional training in the area of fisheries and/or resource economics.

ALTERNATIVE(S): The Regents may not approve the program or may request further information.

FISCAL IMPACT: No additional funding is necessary. The program will be supported through tuition and grants.

CHANCELLOR'S RECOMMENDATION: That the Committee on Education Policy recommend that the Board of Regents approve the proposal from the University of Maryland Eastern Shore to offer the Professional Science Master's in Quantitative Fisheries and Resource Economics.

COMMITTEE RECOMMENDATION: Approval. DATE: June 2, 2010

BOARD ACTION: DATE:

SUBMITTED BY: Irwin Goldstein (301) 445-1992 irv@usmd.edu

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

___X___ New Instructional Program

_____ Substantial Expansion/Major Modification

_____ Cooperative Degree Program

University of Maryland Eastern Shore
Institution Submitting Proposal

Professional Science Master's Degree in Quantitative Fisheries and Resource Economics
Title of Proposed Program

PSM Degree, Quantitative Fisheries and Resource Economics	Fall 2010
Degree to be Awarded	Projected
Implementation Date	
010710	03.0301
Proposed HEGIS Code	Proposed CIP Code
Natural Sciences	Dr. Joseph M. Okoh
Department in which program will be located	Department Contact
410-651-6015	jmokoh@umes.edu
Contact Phone Number	Contact e-mail Address
Signature of President or Designee	Date

Mission

The proposed Professional Science Master's (PSM) Degree Program in Quantitative Fisheries and Resource Economics (subsequently referred to as "Program") provides the educational opportunity to prepare students, especially those from underrepresented minority groups and women, for employment and continued development of student research training in the disciplines of fisheries and resource economics.

This program addresses the mission of UMES. UMES is a teaching, research, and doctoral degree-granting institution that nurtures and prepares leaders in a student-centered environment, particularly from among minorities and women. Committed to providing high quality programs in an ethnically diverse environment, the University prepares students who will serve and shape the global economy. UMES values and promotes the scholarship of faculty, discovery and dissemination of new knowledge, and applying that knowledge to the benefit of the extended community. The University recognizes its responsibility for developing human potential, enriching cultural expressions, and sharing its expertise with individuals, businesses, educational, governmental, and non-governmental organizations.

While the Carnegie Foundation classifies UMES as a Masters Comprehensive University, MA 1, the University aspires to achieve Doctoral/Research University-Intensive classification. Consequently, UMES has developed and implemented freestanding doctoral degree programs in (a) Food Science & Technology, (b) Physical Therapy, (c) Organizational Leadership, (d) Toxicology and (e) Education Leadership.

The proposed Program addresses the mission of the 2004 Maryland Higher Education Commission (MHEC) state plan for postsecondary education. The PSM Program in Quantitative Fisheries and Resource Economics will expand academic course offerings and programs in the Department of Natural Sciences. Specifically, the proposed Program will be congruent with Goals 2, 3, and 5 of the MHEC Maryland State Plan:

> Goal 2: Achieve a system of postsecondary education that promotes accessibility and affordability for all Marylanders.
>
> Goal 3: Ensure equal educational opportunity for Maryland's diverse citizenry.
>
> Goal 5: Promote economic growth and vitality through the advancement of research and the development of a highly qualified workforce.

Currently, the health and science programs are the University's distinct academic emphases. As such, the Department of Natural Sciences (DNS) offers rigorous curricula for students majoring in Biology, Chemistry, and Environmental Science at the baccalaureate level as well as a master's of science degree and doctor of philosophy degree in both toxicology and marine, estuarine and environmental sciences.

Educational Objectives of the Proposed Program

There is a need to recruit and train students, especially individuals from minority populations in fish population ecology and resource economics to help to meet the staff needs of NOAA/NMFS, other federal agencies such as US Fish and Wildlife Service (USFWS) and United States Department of Agriculture (USDA), state agencies, universities, consulting firms, and international aid agencies, in order to more effectively manage our fisheries resources.

The need for NOAA/NMFS to recruit experts in the U.S. to manage our fisheries resources is so great that a workshop was convened on July 17, 2000 by the U.S. National Research Council (NRC) to discuss ways of increasing the number of fisheries stock assessment specialists and social scientists in the United States (NAS, 2000). A PSM degree program developed in collaboration with NOAA and other agencies will enable graduates with excellent quantitative, communication, management and leadership training to be produced who can provide analytical support to the relatively few Ph.D. holders in fish population dynamics and resource economics. However, despite the fact that there are more than 151 PSM programs in 25 states and 79 institutions in the U.S., no HBCU is among the institutions offering PSM programs (The Council of Graduate Schools, 2009). It has also been estimated that less than 10% of the PSM students and graduates belong to under-represented minority groups. Furthermore, although there are currently about 11 PSM degree programs in the area of Environmental Science and Management, no PSM program exists in quantitative fisheries science and resource economics, making the proposed degree program novel. A search of the MHEC program inventory revealed that there were no programs in Quantitative Fisheries and Resource Economics offered at any degree level at any higher educational institution in the state.

Characteristics of the Proposed PSM Program in Quantitative Fisheries and Resource Economics: Articulated Workforce Needs

The number of stock assessment scientists and fisheries socio-economists in the United States is inadequate to meet current demand, and the shortage is predicted to be more severe in the next decade as National Oceanic and Atmospheric Administration (NOAA) and National marine Fisheries Service (NMFS) fisheries scientists and economists retire (NAS 2000, U.S. Department of Commerce and U.S. Department of Education, 2008). Additionally, a recent report prepared by NOAA and submitted to the United States Congress (U.S. Department of Commerce and U.S. Department of Education, 2008) listed nine courses considered “essential curriculum” for training fisheries scientists, including Fish Ecology, Population Dynamics, Fish Stock Assessment, Bayesian Statistics, Multivariate Statistics, and Risk and Decision Analysis. Other courses listed are Fisheries or Natural Resources Computer Programming, Fisheries Modeling, and Sampling Theory. However, many institutions do not require students enrolled in fisheries and aquatic sciences programs to take the courses, and therefore do not offer them. As a result, many students obtaining a degree in fisheries science with specialization in fisheries ecology/population dynamics have inadequate quantitative and modeling skills needed for a career in stock assessment.

The scarcity of stock assessment scientists is occurring at a time when the world’s fisheries resources are threatened by over-harvesting, pollution, habitat destruction and climate change, and there is increasing need in the United States for scientists to help develop the next generation of stock assessments (Tier III) for fish stocks and protected species as indicated in the Stock Assessment Improvement Plan (NRC 1998). Many fisheries in the world are already overexploited (NMFS 1999; 2006). Among the specific research priorities of NMFS are therefore “to increase the number of fish stocks managed at sustainable levels and the number of protected species that reach stable or increasing population levels” (NMFS Strategic Plan 2005 – 2010).

Description of the Program as it would appear in the Catalog

Overview:

PSM degree programs provide an alternate professional career path for bachelor's degree holders in the STEM disciplines to help meet staff needs of industries, consulting firms and governmental agencies, and have been endorsed by the National Research Council (NRC 2008). Addressing the shortage in the number of stock assessment scientists will require the development of innovative programs such as the one proposed to attract students with quantitative backgrounds into fisheries science, a modification of fisheries science curricula at U.S. institutions to include courses required for adequate preparation of students, and the design and delivery of on-line courses and short courses that will be accessible to students. Thus, the proposed UMES PSM degree program will be offered online when fully implemented. The success of the program will be measured using questionnaires administered to students to measure their satisfaction with the content and delivery of the online courses and short courses. In addition, as required by UMES for all courses offered at the institutions, students will evaluate each instructor and course. Results of the student evaluations and comments from course instructors will be used to improve the content and delivery of the courses in subsequent years.

In addition to training and graduating Ph.D. level holders in quantitative fisheries and resource economics to lead innovative research endeavors, there is a need to produce Master's holders who are well trained, not only in the technical subject matter, but also in management, leadership and communication skills. This essentially is the basis on which we propose to establish a PSM degree program with concentrations in quantitative fisheries and resource economics. Graduates of this program will assume intermediate level staff position that will provide the needed analytical support to Ph.D. holders in the area, especially those working in state and federal agencies such as NOAA NMFS.

Course Requirements

Core Courses (*New courses)

1) MEES 699: Special Problems: Internship Experience/Non-thesis Project (as part of internship requirement)	3 credits
2) MEES 642: Fish Population Dynamics and Stock Assessment	4 credits
3) *MEES 643: Risk and Decision Analysis in Natural Resources Management	3 credits
4) MEES 688A: Scientific Communications	3 credits
5) ORLD 617: Personnel Development, Management, and Evaluation	3 credits
6) BUAD 300: Business Ethics	3 credits
Total	19 credits

Quantitative Fisheries Science Concentration
Required Courses (*New courses):

1) MBF 613: Population Dynamics (UM-RSMAS)	3 credits
2) MEES 631: Fish Ecology	3 credits
3) *MEES 644: Multivariate Statistics	3 credits
4) *MEES 641: Fisheries Survey Sampling	3 credits
5) MBF 672: Bayesian Statistics (UM-RSMAS)	
or MBF 614: Advanced Fisheries Modeling (UM-RSMAS)	3 credits
*MEES 648: Ecosystem Modeling for Fisheries	
or *MEES 640: Introduction to Environmental and Resource Economics	3 credits
Total	18 credits

Resource Economics Concentration
Required Courses (*New courses):

*MEES 647: Research Methods in Env. & Natural Resources Economics	3 credits
*MEES 649: Economics of Renewable Resources	3 credits
*MEES 650: Econometrics	4 credits
*MEES 652: Marine Resource Policy	3 credits
AGEC 813: Advanced Microeconomic Theory	3 credits
*MBF 672: Bayesian Statistics	3 credits
Total	19 credits

Non-Thesis Option
A non-thesis research project is completed as part of an internship.

Impact on Students' Technological Fluency
Students in the Program will be required to be competent in scientific computer applications such as Excel to process scientific data, SigmaPlot to produce graphs, Microsoft Powerpoint for the development of quality presentations, Microsoft Publisher to create poster presentations, and Microsoft Word in the preparation of manuscripts. Students must also be proficient in performing literature searches online using various databases.

Expected Student Learning Outcomes
1. To provide students with excellent theoretical knowledge and technical background in quantitative fisheries and resource economics,
2. To enhance the communications skills (oral and written) of the students,
3. To provide student leadership, project management and organizational skills,
4. To foster through internships and other projects the development of collaborative and teamwork skills
5. To enhance student's knowledge of professional ethics.

Quality of Program and Support Faculty

All graduate faculty members possess a terminal degree in an area of fisheries and/or resource or agricultural economics, and supporting areas. (*Affiliate faculty from NOAA or University of Miami-RSMAS)

Faculty/Institution	Rank	Area of Expertise
Paulinus Chigbu (UMES)	Professor	Fisheries Ecology
Bradley Stevens (UMES)	Professor	Shellfish Ecology
Eric May (UMES)	Associate Professor	Fish Pathology/Biology
Dinesh Sharma (UMES)	Professor	Risk & Decision Analysis
Mohammad Ali (UMES)	Assistant Professor	Resource Economics
Thomas. Calo (UMES)	Adjunct Faculty	Human Resource
Malik Malik (UMES)	Associate Professor	Statistics
Albert Chi (UMES)	Assistant Professor	Multivariate/Bayesian Statistics
Nicole A. Buzzetto-More (UMES)	Assistant Professor	Business Ethics
Tao Gong (UMES)	Assistant Professor	Econometrics
Madhumi Mitra (UMES)	Associate Professor	Paleoecology; Scientific Communications
Stephan Tubene (UMES)	Associate Professor	Agricultural Economics
Kristy Wallmo (NOAA/UMES)	Adjunct Faculty	Resource Economics
David Tomberlin (NOAA/UMES)	Adjunct Faculty	Resource Economics
Kevin Chu (NOAA)*	Affiliate Faculty	Marine Policy
Ayeisha Brinson (NOAA)*	Affiliate Faculty	Fisheries Socioeconomics
Elizabeth Babcock (UM-RSMAS)*	Affiliate Faculty	Fisheries; Bayesian Statistics
Jerald Ault (UM-RSMAS)*	Affiliate Faculty	Fisheries Science
David Die (UM-RSMAS)*	Affiliate Faculty	Fisheries Science

Student Audience to be served by the Program and Enrollment Estimates

The students who will be served by the program include those who have completed bachelor's degrees in biological sciences, including marine and environmental science, social sciences (e.g. economics), and mathematical and agricultural sciences. The program will also target employees of federal (e.g. NOAA) and state agencies (e.g. Maryland Department of Natural Resources who may need additional training in the area of fisheries and/or resource economics.

The enrollment estimate is to start with a cohort of at least 6 students in fall 2010, a new cohort of 14 students in fall 2011, and a cohort of 20 students in 2013.

Admission Requirements:

The general admission requirements of the PSM degree program will be similar to those of other M.S. or Ph.D. programs in Science, Technology, Engineering, or Mathematics (STEM) disciplines at UMES. Applicants must have earned a bachelor's degree in any of these disciplines with a minimum cumulative GPA of 3.0 on a 4 point scale. Application materials can be obtained on-line at www.umes.edu/grad, or, by calling 410-651-6507/8626/7966. Applicants must complete: a) Application Forms, b) Certification of Finance Form (for international applicants only), c) Evaluation/Recommendation, d) Maryland Residency Status, and the Statement of Purpose Form. Completed forms and a non-refundable application fee of $30.00 must be submitted to the UMES Graduate School. Domestic students must have their official

transcripts sent directly by the issuing institution to the Graduate School. International students must visit www.wes.org and request an evaluation of their official transcript to be sent to the Graduate School. Deadline for fall 2010 is June 30.

Library Resources

The President assures that the institutional library resources meet the new program goals.

Facilities and Equipment

The faculty members in DNS maintain several modern research facilities and various types of instrumentation. The facilities are housed in Trigg Hall, George Washington Carver Hall, and Richard Hazel Hall. The President assures that the institutional facilities meet the new program goals

Finance

Budget narrative

Resources:

Grants and Contracts

Funds for the UMES PSM program will be provided by a recent three year grant in the amount of $699,999 from the National Science Foundation - NSF (Award # DGE 1011457) for years 1 – 3; and the National Oceanic and Atmospheric Administration for years 3 – 5 (proposal under review).

Tuition:

Tuition revenues are calculated on UMES tuition rates for an in-state graduate student of $243.00/credit hour and $441.00/credit hour for an out-of-state graduate student. The mandatory University fees, per academic year, for a graduate student total $43.00. The enrollment is projected to start with a cohort of 6 students in fall 2010 which will increase to 20 in 2014 (see table below).

Year	2010	2011	2012	2013	2014
Enrollment	6	14	18	20	20
R/NR	R = 4 NR =2	R = 10 NR =4	R = 12 NR =6	R = 13 NR =7	R = 13 NR =7

R = Maryland Resident NR = Non-Maryland Resident

Expenditure

No new full-time equivalent faculty members, or support for present administrative staff is requested.

Senior Personnel: A one month salary ($11,550) for release time is charged to NSF each year of the program for Dr. P. Chigbu and other faculty who will serve as PSM Program Director.

Other Personnel: Salary for a full time PSM Program Coordinator at $41,000/year will be charged to NSF.

Fringe Benefits: Fringe benefits are calculated as 32% of salaries and wages and charged to NSF.

Other Expenses: There will be no new costs for renovated space, library and equipment

TABLE 1: RESOURCES					
Resources Categories	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
1.Reallocated Funds[1]	0	0	0	0	0
2. Tuition/Fee Revenue[2] (c+g below)					

a. #F.T Students
R = MD Resident
NR = Non-Resident
	6
	R=4
	NR=2
		14
		R=10
		NR=4
			18
			R=12
			NR=6
				20
				R=13
				NR=7
					20
					R=13
					NR=7

b. Annual Tuition/Fee Rate based on 9 credits full time **per semester** R=$243/Credit or $2187/9Credits NR=$441/Credit or $3969/9Credits Fees=$43/semester	 $17,496* $15,876 $516	 $43,740 $31,752 $1,204	 $52,488 $47,628 $1,548	 $56,862 $55,566 $1,720	 $56,862 $55,566 $1,720
c. Annual Full Time Revenue (a x b)	$33,888	$76,696	$101,664	$114,148	$114,148
d. # Part Time Students	0	0	0	0	0
e. Credit Hour Rate	0	0	0	0	0
f. Annual Credit Hours	0	0	0	0	0
g. Total Part Time Revenue (d x e x f)	0	0	0	0	0
3. Grants, Contracts, & Other External Sources[3]	750,000[1]	750,000[1]	750,000[1]	500,000[2]	500,000[2]
4. Other Sources	0	0	0	0	0
TOTAL (Add 1 - 4)	$783,888	$826,696	$851,664	$614,148	$614,148

1 = Funding from the National Science Foundation years 1 – 3; 2 = Funding from NOAA years 4 – 5; *obtained by multiplying the dollar amount for 9credits/semester by 2 to get the yearly total amount.

TABLE 2: EXPENDITURES					
Expenditure Categories	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
1. Total Faculty Expenses (b + c below)	$11,550	$11,550	$11,550	$11,550	$11,550
a. # FTE	0.27	0.27	0.27	0.27	0.27
b. Total Salary	$8,750	$8,750	$8,750	$8,750	$8,750
c. Total Benefits	$2,800	$2,800	$2,800	$2,800	$2,800
2. Total Administrative Staff Expenses (b + c below)	$54,120	$54,120	$54,120	$54,120	$54,120
a. # FTE	1	1	1	1	0
b. Total Salary	$41,000	$41,000	$41,000	$41,000	$41,000
c. Total Benefits	$13,120	$13,120	$13,120	$13,120	$13,120
3. Total Support Staff Expenses (b + c below)	0	0	0	0	0
a. # FTE	0	0	0	0	0
b. Total Salary	0	0	0	0	0
c. Total Benefits	0	0	0	0	0
4. Equipment	0	0	0	0	0
5. Library	0	0	0	0	0
6. New or Renovated Space	0	0	0	0	0
7. Other Expenses- Stipends for 6 students @ $16,000/each	$96,000	$96,000	$96,000	$96,000	$96,000
TOTAL (Add 1 - 7)	$161,670	$161,670	$161,670	$161,670	$161,670