UNIVERSITY FACULTY SENATE FORMS

Academic Program Approval

This form is a routing document for the approval of new and revised academic programs. Proposing department should complete this form. For more information, call the Faculty Senate Office at 831-2921.

Submitted by: ____William Ritter_____phone number__831-2468_____

Department: __Biorsources Engineering_____ email address__writter@udel.edu__

Date: ___March 23, 2009_____

Action: _Add Non Thesis Option to MS in BIorseources Engineering_____
(Example: add major/minor/concentration, delete major/minor/concentration, revise major/minor/concentration, academic unit name change, request for permanent status, policy change, etc.)

Effective term_____09 Fall_____
(use format 04F, 05W)

Current degree_____MS_____
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed change leads to the degree of: __MS_____
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed name:_____Bioresoureces_Engineering_____
Proposed new name for revised or new major / minor / concentration / academic unit (if applicable)

Revising or Deleting:

Undergraduate major / Concentration:_____
(Example: Applied Music – Instrumental degree BMAS)

Undergraduate minor:_____
(Example: African Studies, Business Administration, English, Leadership, etc.)

Graduate Program Policy statement change:_____
(**Must attach** your Graduate Program Policy Statement)

Graduate Program of Sudy:_____MS Bioresources__Engineering_____
(Example: Animal Science: MS Animal Science: PHD Economics: MA Economics: PHD)

Graduate minor / concentration:_____

Note: all graduate studies proposals must include an electronic copy of the Graduate Program Policy Document, highlighting the changes made to the original policy document.

List new courses required for the new or revised curriculum. How do they support the overall program objectives of the major/minor/concentrations)?
(Be aware that approval of the curriculum is dependent upon these courses successfully passing through the Course Challenge list. If there are no new courses enter "None")
None

Explain, when appropriate, how this new/revised curriculum supports the 10 goals of undergraduate education:
http://www.ugs.udel.edu/gened/
NA

Identify other units affected by the proposed changes:
(Attach permission from the affected units. If no other unit is affected, enter "None")
The proposed MS program should have minimum impact on other programs. The Civil and Environmental

Engineering Department has a graduate program in environmental and water resources engineering but the two programs should not be competing for the same pool of graduate students. Environmental research in the Bioresources Engineering Department is focused on nonpoint source pollution, while research in Civil and Environmental Engineering is focused on assessment and treatment of environmental contaminants, environmental chemistry, biological waste treatment, groundwater hydrology and design and management of waste treatment facilities. There are no existing programs in the plant and animal systems engineering area within the University of Delaware to compete with. The non-thesis masters degree takes advantage of the areas of specialization of the Bioresources Engineering Faculty.

In addition, non thesis masters degrees are more suitable for continuing education or non-traditional students. Non thesis masters degrees are relevant especially for students with industry experience whose employment precludes them from conducting the extensive research required for a master's thesis. The objective of the non-thesis option is to allow these students to obtain an advanced degree of comparable quality and depth to the traditional master's degree with thesis. All Masters of Science programs in the College of Engineering include non-thesis options.

In particular, for a developing Masters Degree program, a non thesis masters degree would increase student count and allow currently planned courses to be offered on a more regular basis.

Non-thesis option is available only for the Land and Water Resources emphasis area.

Describe the rationale for the proposed program change(s):

(Explain your reasons for creating, revising, or deleting the curriculum or program.)

This proposal would add a non-thesis option to the existing thesis track. The Master of Science in Bioresources Engineering will prepare students for employment in industry, consulting and government. The two areas of emphasis of the new MS program will be in land and water resources and plant and animal systems. The objectives of the program are to provide an opportunity for training beyond the bachelors degree for students and enhance the research and scholarship of the Bioresources Engineering Department. Well established areas of research in the Bioresources Engineering Department are in water resources and animal and plant systems. A non-thesis option will be added in Land and Water Resources, allowing continuing education students in the area to complete a masters degree. The non-thesis option is an appropriate option for students planning to continue in a professional engineering career.

Program Requirements:

(Show the new or revised curriculum as it should appear in the Course Catalog. If this is a revision, be sure to indicate the changes being made to the current curriculum and **include a side-by-side comparison** of the credit distribution before and after the proposed change.)

The non-thesis option is in the Land and Water emphasis area. The only difference between the thesis and non-thesis option is the thesis option requires 24 credits of course work and 6 credits of thesis while the non-thesis option requires 30 credits of course work. The course work required is as follows

Land and Water Resources Non-Thesis Option

Core Courses	Credits
BREG 622 Watershed Modeling	3
BREG 621 Nonpoint Source Pollution Control	3
BREG/PLSC 603 Soil Physics	3
BREG 623 Advanced Storm Water Management	3
BREG 631 Experimental Research Methods	3
Additional 600 level or above mathematics or statistics course	3

Four courses (600-level or above) taken with approval of faculty advisor	12
Total	30

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ROUTING AND AUTHORIZATION: (Please do not remove supporting documentation.)

Department Chairperson _____ Date _____

Dean of College _____ Date _____

Chairperson, College Curriculum Committee _____ Date _____

Chairperson, Senate Com. on UG or GR Studies _____ Date _____

Chairperson, Senate Coordinating Com. _____ Date _____

Secretary, Faculty Senate _____ Date _____

Date of Senate Resolution _____ Date to be Effective _____

Registrar _____ Program Code _____ Date _____

Vice Provost for Academic Affairs & International Programs _____ Date _____

Provost _____ Date _____

Board of Trustee Notification _____ Date _____

Revised 02/09/2009 /khs

Proposal For Revision to Bioresources Engineering Masters Degree Program

I. This proposal is for a revision to the provisional Master of Science in Bioresources Engineering. This proposal would add a non thesis option to the existing thesis track. The Master of Science in Bioresources Engineering will prepare students for employment in industry, consulting and government. The two areas of emphasis of the new MS program will be in land and water resources and plant and animal systems. The objectives of the program are to provide an opportunity for training beyond the bachelors degree for students and enhance the research and scholarship of the Bioresources Engineering Department. Well established areas of research in the Bioresources Engineering Department are in water resources and animal and plant systems. Research in the department in water resources includes projects in nonpoint pollution, stormwater management, water quality modeling, bioremediation, land application of wastewater, irrigation water management and vegetative control on drainage ditches. Research in plant and animal systems includes projects on vegetable harvesting, mushroom environmental management, poultry house environmental management and sensor technology.

II. Rationale and Demand

A1. Compatibility with the University of Delaware Mission.

The proposed revised MS program will apply the ideals of excellence in research and scholarship as identified in the University of Delaware's mission statement to Bioresources Engineering. Graduates from this program will fulfill the needs for qualified engineers in land and water resources and plant and animal systems.

A2. Description of the Planning Process

In 2001, the Bioresources Engineering Department underwent an academic program review. In preparing the self study report there was discussion at several department meetings on graduate education. The academic program review team cited the lack of a graduate program as one of the weaknesses of the Department. Although several of the faculty members have joint appointments in the College of Engineering and the Department participates in the interdisciplinary Operations Research graduate program, this approach has not been entirely successful. In particular it has been difficult for new faculty to utilize and advise graduate students in their research under the current arrangements. Because of this it was decided that the Department needed to create opportunities for the new faculty members that have been hired since 2001 to advise and utilize graduate students in their research. The only satisfactory way to do this was to develop an MS program in Bioresources Engineering. A new MS program in Bioresources Engineering was approved and the first student entered in fall 2008. The new program only has a thesis option. There are engineers in the region working for consulting firms and state agencies who would like to enroll in a MS program part-time. It was decided to add a non thesis option to the MS program in Bioresources Engineering in the Land and Water option to attract working engineers..

A3. Impact on Other Programs

The proposed MS program should have minimum impact on other programs. The Civil and Environmental Engineering Department has a graduate program in environmental and water resources engineering but the two programs should not be competing for the same pool of graduate students. The program in Bioresources Engineering Department is focused on nonpoint source pollution and stormwater management, while the program in Civil and Environmental Engineering is focused on assessment and treatment of environmental contaminants, environmental chemistry, biological waste treatment, groundwater hydrology and design and management of waste treatment facilities. In addition, non thesis masters degrees are more suitable for continuing education or non-traditional students. Non thesis masters degrees are relevant for especially for students with industry experience whose employment precludes them from conducting the extensive research required for a master's thesis. The MS in Civil and Environmental places more emphasis on fulltime graduate students doing a thesis.

The objective of the non thesis option is to allow these students to obtain an advanced degree of comparable quality and depth to the traditional master's degree with thesis. Several other Masters of Science in Engineering including Civil Engineering and Electrical and Computer Engineering include non-thesis options.

In particular, for a developing Masters Degree program, a non thesis masters degree would increase student count and allow currently planned courses to be offered on a more regular basis.

The non thesis option is available for Land and Water Resources, however, if successful; a non-thesis option would be added for Plant and Animal Systems.

A4. Utilization of Existing Resources

The proposed non thesis option for the MS degree will not require additional resources beyond the resources required for the provisionally approved MS program. The MS degree will build on existing University of Delaware coursework and the Bioresources Engineering Department and College of Agriculture and Natural Resources research (CANR) capabilities..

B1. Enrollment Projections

It is anticipated that the program for the thesis option will be initiated with five to ten matriculated students and grow to about 15 students. We anticipate that the non thesis option will potentially add another 5 to 10 students to the program. Students may enroll fulltime or part time. The number of students accepted each year will depend upon funding available and faculty research. Students in the non-thesis option would be required to pay their own way.

B2. Specific Student Clientele

Students admitted to the program will be from bioresources engineering or similar named engineering programs, civil and environmental engineering, mechanical engineering and electrical engineering bachelor degree programs. Students with the appropriate course work from undergraduate engineering technology, appropriate science and/or technical programs will also be admitted.

C. Transferability (not applicable)

D. Graduate/Professional Program Access (not applicable) or See II A2

E. Demand and Employment Factors

The demand for graduates of the program should be strong. Federal agencies like the Natural Resources Conservation Service who hire bioresources/agricultural engineers require an MS as an entry level degree. There is a strong demand in the environmental engineering consulting field for engineers with MS degrees. Within the region, there are few competing MS programs and fewer MS programs with a non thesis option that are suitable for continuing education students.

E1. Regional/State/National Factors

There is no other graduate program in bioresources engineering or similarly named programs in Delaware. The University of Maryland and Pennsylvania State University have both MS and Ph.D. programs in bioresources engineering. Rutgers University eliminated their bioresources engineering department a number of years ago and no longer have an undergraduate or graduate program in bioresources engineering. Consequently, we expect some students from the Delaware Valley, particularly part-time individuals already employed, to participate in the program.

F2. Accrediting/Professional Mandates (not applicable)

G. Other Strengths

G1. Special Features

The non thesis option in the Bioresources Engineering MS program will increase the number of students in the Department's graduate courses and reduce the chance of courses being cancelled because of low enrollment.The graduate program in Bioresources Engineering will compliment the strong Accreditation Board for Engineering and Technology (ABET) accredited program the Department has in Engineering Technology.

G2. Collaborative Agreements (not applicable)

III. Enrollment Admissions and Financial Aid

A. Enrollment Limitations/Criteria

As mentioned above (II B1), it is expected enrollment initially will be from five to ten students. Students will be admitted to the program based upon the availability of funding and their ability to meet the recommended entrance requirements. Students selecting the non-thesis option are not eligible for financial support from the University.

B. Admission Requirements

B1 Criteria

The following criteria will apply to the students admitted:

a. A BS in engineering or related field.
b. An undergraduate index of 2.8 overall and 3.0 in their major field of study out of 4.0 or the equivalent for students with degrees outside the US.
c. Completion of mathematics through differential equations.
d. A combined score of 1050 on the verbal and quantitative portions of the GRE.
e. A paper-based TOEFL score of at least 550 (or 213 computer-based) is required for non-native English students.
e. Three letters of recommendations that address the student's likelihood of successfully completing graduate education.

Students in the non-thesis and thesis options have the same admissions requirements.
Students who do not meet all of these criteria may be admitted on a provisional basis subject to approval and completion of subject area deficiencies as indicated by the department Graduate Studies Committee.

B2. Transfer policy (not applicable)

B3. Retention Policy (not applicable)

C. Student Expenses and Financial Aid

C1. Extraordinary Required Student Expenses

No extraordinary expenses beyond the normal graduate student fees or expenses are expected.

C2. Student Financial Support

Students selecting the non-thesis option are not eligible for financial support from the University.
Students who are currently or have previously received assistantship funding are not eligible to change to the non-thesis option without expressed permission of the Bioresources Graduate Committee.

IV. Curriculum Specifics

A. Degree Awarded

Master of Science in Bioresources Engineering

B. Curriculum

B1. Requirements

Thesis Option

A minimum of 30 credits is required for the Master of Science degree. It is to include 24 credits of approved course work and 6 credits of thesis BREG 869. Of the 24 credit hours of approved course work, at least 3 credits must be a statistics or advanced math course. Only graduate level courses (500 – 599), (600 - 699), (800 - 899) are applicable towards the course requirements. Selection of courses will be done in consultation with the chair of the thesis committee based upon the student's interest and area of research.
The awarding of the Master of Science degree is also contingent upon an approved research proposal, the successful oral defense of the research performed and an acceptable thesis.

Non Thesis Option

A minimum of 30 credits is required for the Master of Science degree. Of the 30 credit hours of approved course work, at least 3 credits must be a statistics or advanced math course. Only graduate level courses (500 – 599), (600 - 699), (800 - 899) are applicable towards the course requirements. Selection of courses will be done in consultation with the chair of the thesis committee based upon the student's interest and area of research.

Through a program of course work, non-thesis students can develop their engineering skills and obtain a state-of-the-art background within their chosen area of study. *Students originally enrolled in the thesis master's degree program may not transfer to the non-thesis option except under special circumstances and with the approval of their thesis advisor and the departmental Graduate Committee.*

Land and Water Resources

Core Courses	Credits
BREG 622 Watershed Modeling	3
BREG 621 Nonpoint Source Pollution Control	3
BREG/PLSC 603 Soil Physics	3
BREG 623 Advanced Storm Water Management	3
BREG 631 Experimental Research Methods	3
Additional 600 level or above mathematics or statistics course	3
Four courses (600-level or above) taken with approval of faculty advisor	12
Total	30

Plant and Animal Systems does not have a non-thesis option.

B2. Sample Curriculum

Upon acceptance into the program, students will meet with their advisor to formalize their curriculum. They will choose approved courses relevant to the Land and Water Resource option, The Department presently offers BREG 603, 622, 623,628 and 666 as graduate level courses. The Department is also adding BREG 631 Experimental Research Methods.

V. Resources Available

A. Learning Resources

The MS program will be supported by excellent print and electronic resources available for engineering and agriculture through Morris Library and its branches.

B. Faculty/Administrative Resources

The proposed graduate program will be administered by the chair of the Bioresources Engineering Department. The following Bioresources Engineering Department faculty and professional staff are available to support the proposed graduate program and are encouraged to advise graduate students.

Name	Specialization	Rank	Highest Academic Degree
Carmine Balascio	Water Resources	Associate Professor	Ph.D.
Eric Benson	Machine Vision and Applied Controls, Applied Poultry Engineering	Associate Professor	Ph.D.
Anastasia Chirnside	Environmental Engineering	Scientist	Ph.D.
James Glancey	Machine Design and Automation	Associate Professor	Ph.D.
Ian McCann	Irrigation Management	Assistant Professor and Extension Engineer	Ph.D.
William Ritter	Water Resources	Professor	Ph.D.
Shreeram Inamdar	Water Resources	Assistant Professor	Ph.D.

C. External Funding

The Bioresources Engineering Department has over $400,000 in external funding to support research. Funding sources include USDA, US Poultry and Egg Association, EPA, DNREC, New Castle County, and CANR

Agricultural Experiment Station competitive grants.

VI. Resources Required

A. Learning Resources

No new learning resources are needed to implement the proposed program.

B. Faculty/Administrative Resources

No new positions will be required for the proposed program.

C. Budgeting Needs:

No additional funding is requested for the non thesis option. Students in the non thesis option are not eligible for financial support from the University.

VII. Implementation and Evaluation

A. Implementation Plan

Once the non thesis option is approved by the various University committees and the Faculty Senate, the Department will start soliciting applications immediately for the next academic year. The Bioresources Engineering Department underwent an academic program review (APR) in 2001. It is anticipated that the next APR will include a review of the proposed program, assuming that provisional status is approved.

B. Evaluation Plan

The normal university process will be to give the new program temporary status. Review for permanent approval will be scheduled for five years after the startup of the program. The review procedure for the program will follow standard University of Delaware review protocol for M.S. programs.

Appendix A. List of Available Graduate Courses in the Department:

BREG 603 - Soil Physics (3)
BREG 628 - Natural Wastewater Treatment Systems (3)
BREG 621 - Nonpoint Source Pollution (3)
BREG 622 - Watershed Modeling (3)
BREG 623 Advanced Stormwater Management (new) (3)
BREG 631 - Experimental Methods for Engineers (new) (3)
BREG 666 - Special Problems (1-6)
BREG 869 - Masters Thesis (1-6)