

MEMORANDUM

To: Board of Regents

From: Board Office

Subject: Proposal for a New Interdisciplinary Graduate Program in Biorenewable Resources and Technology at Iowa State University

Date: September 9, 2002

Recommended Action: Approve Iowa State University's proposal to establish a new interdisciplinary graduate program in Biorenewable Resources and Technology.

Executive Summary: Iowa State University is requesting approval for a new interdisciplinary graduate program in Biorenewable Resources and Technology. The degree offerings will include a Master's degree, a Ph.D. degree, and a Ph.D. minor.

Need for the Program Biorenewable resources are receiving increasing national attention. A permanent council on biorenewable resources¹ coordinates national planning for research in biobased products. Large chemical companies, including Dupont and Dow, have expanded into biobased products by purchasing companies with plant science and production capabilities to complement their processing and utilization expertise. However, few scientists and engineers have been appropriately trained to work in the interdisciplinary field of biobased products. Iowa State University has an opportunity to lead the nation in training students for this emerging field².

Program Objectives The proposed program has the following strategic outcomes:

- Provide advanced training for students in the areas of plant science, production, processing, and utilization related to biobased products.
- Facilitate interdisciplinary research focused on these technologies and their implementation.
- Prepare students to address challenges involved in transitioning to a biobased economy in Iowa and other regions of the world.
- Promote innovative research that reflects the University's commitment to public service and excellence in scholarship.

¹ The council consists of the Secretaries of Agriculture and Energy, the EPA Administrator, the Director of the National Science Foundation, and other agency heads.

² The National Research Council estimates that one million new jobs will be created in the biobased chemicals industry in the next 20 years.

Not Duplicative There are no comparable programs at other universities within the state.

Interinstitutional and Board Office Review The Interinstitutional Committee on Educational Coordination (ICEC) and the Board Office have reviewed this request and are recommending approval.

Submission to ICCPHSE No objections were raised when this proposal was submitted to and reviewed by the Iowa Coordinating Council for Post-High School Education (ICCPHSE).

Link to Strategic Plan: This effort is part of the institutional activities which help the Board of Regents achieve its objective to improve access to the Regent institutions as stated in its Strategic Plan:

KRA 2.0.0.0 Provide access to educational, research, and service opportunities within the missions of the Regent institutions.

Objective 2.2.2.0 Evaluate annually and, where appropriate, make recommendations to meet relevant educational and service needs of the state.

Background: Traditional academic disciplines are not well organized to train engineers and scientists for a biobased products industry. Students must acquire knowledge outside traditional academic disciplines, gain an appreciation of system-level research and development, hone skills for working on teams and communicating with diverse groups of people, and understand the culture of market-driven companies.

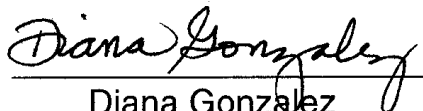
Analysis: The graduate programs in Biorenewable Resources and Technology will help students prepare for careers in the biobased products industry.

Projected Costs The costs for the proposed program are projected to be \$86,500 per year for the first three years. The additional resources that are needed are for graduate assistants and staff support. ISU was successful in obtaining three-year funding for the program from the Department of Energy; therefore, all the new resources required for the proposed program will be borne by the grant.

Effect of Loss of External Funding The major effect of the grant termination would be loss of support for graduate student stipends. The academic program could continue without funding for graduate assistant support, though the likely result would be declining enrollments. However, opportunities for student support to study biorenewable resources through individual faculty grants and contracts are increasing rapidly. ISU is optimistic about the prospect for continued funding and the recruitment of students for this program.

Regent Program Review Questions Attached is a copy of the University's responses to the Regent New Program Review Questions (pages 4–8).

Recommendation Approve Iowa State University's proposal to establish a new interdisciplinary graduate program in Biorenewable Resources and Technology.



Diana Gonzalez

Approved: 

Gregory S. Nichols

Board of Regents New Program Review Questions (Majors)

M.S., Biorenewable Resources and Technology

Ph.D., Biorenewable Resources and Technology

1. Need

- a. How will this proposed program further the education and curriculum needs of the students in the discipline?

A graduate program in *Biorenewable Resources and Technology* will be established that offers students advanced study in the use of plant and crop-based resources in the production of biobased products (fuels, chemicals, materials, and energy). Traditional academic disciplines are not well organized to train engineers and scientists in the emerging biobased products industry. Students must acquire knowledge outside traditional academic disciplines, gain an appreciation of system-level research and development, hone skills for working on teams and communicating with diverse groups of people, and understand the culture of market-driven companies.

- b. How does it further the educational and curriculum needs of other units in the college of university?

The program is multi-disciplinary and will serve students from a variety of disciplines including engineering, chemistry, agronomy, food science, biochemistry, and microbiology, to name a few. The program is specifically designed to encourage students to obtain co-major graduate degrees in Biorenewable Resources and Technology and a more traditional academic discipline. Thus, students can use the Biorenewable Resources and Technology program to diversify their academic training.

2. Other programs

- a. What programs in this field of study are available in other colleges and universities in Iowa?

As recently as last year, no comparable programs existed at other universities in the United States. In anticipation of growing national need for engineers and scientists to develop biobased products, the U. S. Department of Energy has recently launched a grants program to encourage formation of such programs at U. S. universities. Iowa State has won two awards to launch training programs in biobased products (the money supports research assistantships). Most other schools are only proposing certificate programs or minor degree programs as cautious entries into this new field, giving us an opportunity to provide academic leadership. No such programs exist at the other Regent universities.

- b. With what representatives of these programs have you consulted in developing this proposal? Provide a summary of the reactions of each institution consulted as well as the complete text of the response.

Only the three Regent universities in Iowa have science and technology graduate programs that might contemplate adding a comparable program. Representatives from the other two Regent schools were consulted on this issue. Summaries are given below. Full text is provided in Appendix A.

John Rosazza, University of Iowa – no comparable degree program
Rex Montgomery, University of Iowa – no comparable degree program
Alec Scranton, University of Iowa – no comparable degree program
Bill Stiglani, University of Northern Iowa – no comparable degree program

- c. In what ways is this proposed program similar to those mentioned in 2a? In what ways is it different or does it have a different emphasis?

No comparable programs with which to compare.

- d. How does the proposed program supplement the current programs available?

No comparable programs with which to compare.

- e. Has the possibility of some kind of inter-institutional program or other cooperative effort been explored? What are the results of this study?

No. The effort would be premature as the field is in its infancy.

- f. List the Iowa institutions in which articulation agreements are being developed for the proposed program.

N/A.

- g. Provide the Classification of Instructional Program (CIP) code for the proposed program.

30.9999 Multi/Interdisciplinary Studies

3. Please estimate the enrollment in this program for the next five years as follows:

	Years	1	2	3	4	5
a.	Undergraduate	-----not applicable-----				
b.	Graduate	5	8	15	25	30

- c. On what basis were these estimates made?

Based on preliminary interest expressed by faculty at ISU in our biorenewable resources initiative, we expect up to 30 faculty members to be contributing to this field at its maturity. On average, productive faculty members support about four graduate students. As a conservative estimate, we think one-fourth of these students will opt for a major or co-major in Biorenewable Resources and Technology. Thus, a mature program will probably have about 30 students enrolled (most expected to be enrolled in co-major programs). Growth will depend on availability of extramural funding. Extramural funding is immediately available to help support eight students.

- d. What are the anticipated sources of these students?

Students will be recruited among students working with faculty members in traditional academic departments who have research programs related to biorenewable resources. A recruitment program will be put in place designed to recruit additional students to ISU.

4. Please provide any available data or information on employment opportunities available to graduates of this program in Iowa and nationally.

A recent study released by the National Research Council (Biobased Industrial Products, National Academy Press, Washington, D. C., 2000) estimates that one million new jobs would be created in the biobased chemicals industry alone (excludes fuels, materials, and energy) in the next twenty years. Assuming that 2% of this new workforce is technical and managerial, as many as 1000 new jobs appropriate to graduates of this program will become available each year.

5. Are there accreditation standards for this program? If so, please provide a copy of the Accreditation standards.

No.

- a. What is the accreditation organization?

N/A.

- b. What accreditation timetable is acceptable/

N/A.

6. Does the proposed program meet minimal national standards for the program, e.g., Council of Graduate Schools or other such bodies?

The Council has not reviewed this proposal.

7. Please report any reactions of the Iowa Coordinating Council for Post-High School Education.

The proposal was submitted to the ICCPHSE on 5/23/02; there were no objections.

Additional Resource Needs

Either question one or question two requires a "yes" answer. In addition to a "yes" response to one of the first two questions, question three and question four should be answered. If applicable, question five should be answered.

1. Will the program require new resources? Yes X No ___
If "yes," what is the plan to obtain new resources?

The U. S. Department of Energy has granted ISU funds to support the first three years of this new academic program. Although most of the direct costs of this \$375,000 grant are allocated to support graduate students in the program, \$19,170 is available to support administration of the program. The direct cost of the program for three years totals \$259,500. The indirect costs for this award amount to \$115,500 (44.5%)

Administrative demands from this graduate program are considerably less than for an academic department because students in this multi-disciplinary program will be assigned home departments in traditional academic departments, which will handle research appointments and most other graduate student matters. The Center for Sustainable Environmental Technologies, one of the centers within the Institute for Physical Research and Technology, will be responsible for program specific forms and procedures.

Only three new courses will be added as a result of the proposed program in Biorenewable Resources and Technology: a seminar course, a lab course, and a foundations (lecture) course. (The three new courses tie the existing courses into a coherent, new program of study.) The seminar course will be integrated with existing seminar series currently offered at ISU; it represents a minor addition to workload of faculty. The laboratory requirement is drawn from four new laboratory courses in biobased products developed by the Department of Chemical Engineering with support from the National Science Foundation; no new faculty time commitment is expected. The foundations course is the only new offering requiring significant new commitment of faculty time. However, instruction of this course will be rotated among several faculty members who will teach it as part of their normal graduate teaching responsibilities. No new faculty resources are sought to support the Biorenewable Resources and Technology Program.

2. Will the program require reallocated resources? Yes No

If "yes," what is the university's reallocation plan to fund this program?

3. At what level of enrollment will additional resources be required for the program?

Program enrollment would have to exceed 30 students before current administrative resources would require additional support.

4. Estimate the total costs (or *incremental increases in expenditures*) that may be necessary as a result of the new program for the next three years.

	First Year	Second Year	Third Year
a. Faculty			
b. Graduate Assistants	\$78,590	\$80,985	\$80,755
c. General Expense (supplies)*	\$1,000	\$1,050	\$1,100
d. Equipment			
e. Library Resources			
f. New Space Needs (estimated amt. & cost of new and/or remodeled space)			
g. Computer use			
h. Other resources (staff support)*	\$6,910	\$4,465	\$4,645
TOTAL(S)	\$86,500	\$86,500	\$86,500

These funds will come from the recent U. S. Department of Energy grant. Line-items marked with an asterisk represent the administrative component.

5. For programs planning to use external grants, what would be the effect of the grant termination?

The major impact would be loss of support for graduate student stipends. However, opportunities for student support to study biorenewable resources through individual faculty grants and contracts are increasing rapidly. Both the U. S. Department of Energy and the U. S. Department of Agriculture are expanding their research efforts in this new field; ISU has been particularly successful in attracting new funds in this field. The impact on administering this program would be minimal as the Center for Sustainable Environmental Technologies already has both research and educational missions in biorenewable resources, which gives it some flexibility in use of its current administrative resources.

As for any doctoral program, this new program will depend upon grant and research funding for the graduate students enrolled in the program. The academic program could continue without such funding for graduate assistant support, though the likely result would be declining enrollments. Iowa State University is optimistic about the prospect for continued funding and the recruitment of students for this program.