



DEPARTMENT OF  
MATHEMATICAL SCIENCES

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January 24, 2006

MEMORANDUM

TO: Cindy Shenkle, Interim Asst. Dean  
University Advisement Center

FROM: Peter Monk, Chair *P.M.*  
Mathematical Sciences

SUBJECT: Permanent Status Program Review (PSPR)

In response to Vice Provost Gempesaw's memo of January 18, 2006, we are pleased by the positive evaluation report on the Permanent Status of the B.S. in Mathematics and Economics. Please submit the proposal for approval by the University Faculty Senate.

PB/pi  
Attachments

cc: Conrado M. Gempesaw, Vice Provost for Academic and International Programs  
Karren Helsel-Spry, Faculty Senate Office  
Gilbert Schleiniger, Mathematical Sciences



OFFICE OF THE VICE PROVOST  
FOR ACADEMIC AND  
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January 18, 2006

MEMORANDUM

TO: <sup>Peter</sup>  
Peter Monk, Chair  
Mathematical Sciences

FROM: <sup>Robby</sup>  
Conrado M. Gempesaw  
Vice Provost for Academic and International Programs

SUBJECT: Permanent Status Program Review (PSPR)

Attached are the PSPR internal reviews for the B.S. in Mathematics and Economics. As part of the PSPR process (see <http://www.udel.edu/facsen/course/index.html#Final>, Timeline for PSPR), we request that the department write a brief response to this review and forward the document to the appropriate college committee and/or the Dean's Office. The Dean's Office will then forward all the documents to the Faculty Senate (c/o Karren Helsel-Spry) so it can be considered for approval by the University Faculty Senate.

Please let me know if you have any questions.

dld  
Attachments

cc: Avron Abraham, Faculty Senate President  
Karren Helsel-Spry, Faculty Senate Office  
Dean's Office, College of Arts and Sciences

Permanent Status Major Review  
for  
B.S. in Mathematics and Economics

Evaluation Report

Joshua M. Duke  
Associate Professor  
Food and Resource Economics

Thomas Johnston  
Instructor  
Accounting and MIS

We have met and thoroughly reviewed the materials submitted to the Provost's Office, regarding the permanent status major review for the B.S. in Mathematics and Economics (the major). Since it was established in 2000, the major has grown steadily and has already graduated 17 students. We believe that the major is well-conceived, appropriately designed, and makes an important contribution to student learning options at the University of Delaware. As such, we support the granting of permanent status to this major. Specific areas of review are addressed below.

**Objectives, Strengths, and Weaknesses**

The principal goal of the major is to provide opportunities for an especially rigorous curriculum in mathematical economics for students with interest in Economics graduate study. The major achieves this goal. It is difficult to overstate the degree to which advanced economic research has come to rely on advanced mathematical and statistical skills. The major is innovative in recognizing this trend and designing a challenging, coherent, yet flexible, curriculum to help prepare students for this course of graduate study. We know of no other major of its kind. Moreover, the major complements existing degrees in Mathematical Sciences and in Economics, offering additional opportunities to students with an interest in graduate studies. The major is compatible with the University's academic priorities. We identified no weaknesses in the major.

**Impact and Demand**

The designers of this major cleverly constructed a curriculum, which adds value to the University and which expands student learning opportunities, from existing courses. The entire course of study seems, at most, merely to add a single capstone course (and it may be that this was an existing course, which was simply adjusted to meet the needs of students in the major). The benefits of the major extend to the faculty and now offer a vehicle for collaboration between the Economics and Mathematical Sciences Departments. The major is supported by the Chair of Economics and the Dean of Arts and Science. The evidential materials suggest that the faculty involved in the major support permanent status.

Although the major has been available for only five years, it has already graduated 17 students and enrollments have continually increased. The curriculum itself demonstrates that the faculty is offering new opportunities for students, which better fit the demands of

the academic market in Economics. Evidence exists that students are being advised and mentored appropriately. For example, the director states plans to expand undergraduate research opportunities for these students. We concur and would suggest that students take advantage of the many opportunities for undergraduate research at the University, including the Social Science Scholars Program and Degrees with Distinction.

In our judgment, the major does not require additional resources (other than, perhaps, the aforementioned capstone course), does not create additional student expenses, and does not have additional admission requirements.

### **Evaluation**

The major addresses, most directly, three of the ten goals of General Education:

Goal 1: Attain effective skills in oral and written communication, quantitative reasoning, and the use of information technology

Goal 2: Learn to think critically to solve problems

Goal 6: Develop the intellectual curiosity, confidence, and engagement that will lead to lifelong learning

The major also should achieve the other goals of General Education via the College and University requirements.

As discussed above, the major offers a well-conceived curriculum addressing the needs of students wishing to study Economics at the graduate level. We could identify no holes in this curriculum. As such, the coursework seems to address, clearly and completely, the knowledge, values, skills, and other learning-outcome requirements for students. The assessment of these learning outcomes is increasingly recognized as an important tool of evaluation. Although the documents we evaluated did not contain an explicit plan, we did find evidence of tracking graduates and an intention to continue to enhance this effort in the future. The preliminary evidence is positive. The major is placing students in top Economics programs, including Maryland, Penn, Carnegie-Mellon, and Georgetown. In addition, students in the major have earned numerous awards at the department and college levels.





OFFICE OF THE PROVOST

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November 17, 2005

TO: Joshua Duke  
Food and Resource Economics

FROM: Dan Rich, Provost   
Bobby Gempesaw, Vice Provost 

SUBJECT: Permanent Status Program Review in BS in Mathematics and Economics

As part of its on-going commitment to maintain the highest quality academic programs possible, the Office of the Provost coordinates the reviews of provisional majors and programs to determine whether or not they will be granted permanent status. A key component of this process involves a team of two faculty members who will review the program's self-study report. In the case of undergraduate programs, one member of the review team will be a current member of the Faculty Senate Undergraduate Studies Committee; the other member will be a faculty member from a department or program other than the one being considered for permanent status. In a few cases, we may invite a faculty member from another institution to serve as an external reviewer.

We are writing to inquire whether you would be willing to serve as a reviewer for the BS in Mathematics and Economics which is offered by the College of Arts and Sciences. Your commitment would involve evaluating the viability of the proposed major or program based on the program's self-study report. We will also request that you participate in writing a brief evaluation report (one to two pages) that will be submitted to the relevant Faculty Senate committee as an input for their own review deliberations. We will share the evaluation report with the department and college dean so they are aware of your recommendations. At this point, we anticipate the review to occur from December 1, 2005 to January 15, 2006. We request that the evaluation report be completed by January 15, 2006 to allow the program faculty time to respond to your findings and for the pertinent Faculty Senate committee to complete its own review process by February 2006.

Please feel free to contact us if you have any questions about the process. For your information, a complete description of the Permanent Status Program Review (PSPR) procedures is available on the web at <http://www.udel.edu/facsen/course/index.html#PSPR> which also contains the attached sample outline of the evaluation report.

Thank you for considering this request and please let Dianna DiLorenzo ([diannad@udel.edu](mailto:diannad@udel.edu)) know by Monday, November 28, 2005 if you are able to participate in the PSPR process. If you agree to participate, we will send you a copy of the self-study report.

cc: Thomas Ilvento, Chair, Food and Resource Economics  
Faculty Senate President  
Chair, Faculty Senate Undergraduate Studies Committee  
Faculty Senate Office

# Proposal for Permanent Status of the BS in Mathematics and Economics

G. Schleiniger

December 20, 2005

## 1 Description

The BS in Mathematics and Economics is a bachelors program offered jointly by the Department of Economics (School of Business and Economics) and the Department of Mathematical Sciences (School of Arts and Sciences). The program is administered by the College of Arts and Sciences. Students in this program follow a rigorous study of both mathematics and economics in preparation for graduate studies in economics. Enough flexibility is built-in the program to allow students who desire to pursue graduate studies in mathematics to obtain the necessary preparation to do so. Students who will enter the workplace immediately after the BS will also benefit, as the workplace environment for economists is favorable to those with a strong mathematical foundation.

The BS in Mathematics and Economics includes the basic courses in Calculus, Differential Equations, Linear Algebra, and Discrete Mathematics offered in Mathematical Sciences, followed by four alternative tracks in Probability and Statistics, or Mathematical Analysis, or a more general applied mathematics track (advanced calculus, numerical computing, linear programming). The courses taken in the Department of Economics include Macro and Micro Economics, Econometrics, followed by two tracks depending on the student's interests. Students are required to take a minimum of 39 credits in Mathematics and Economics at the 300-level or above (excluding some math education courses), and they are also required to take a capstone course, ECON/MATH 530 (cross-listed) — Optimization and Game Theory.

Success of this program can be measured by the success of its graduates. The learning outcomes are defined by the courses that are required for the major.

## **2 Rationale and Demand**

The program was first established to attend the demand of students who wish to obtain a degree in Economics with a strong background in Mathematics. Such a degree prepares students well for graduate studies in Economics, and, with proper choices of alternative tracks, prepares students for graduate studies in Mathematics. Both the Department of Economics and the Department of Mathematical Sciences saw an opportunity to collaborate in offering such a program without excessive demands of additional resources. Only one course, the capstone course, was introduced to provide an additional bridge between the disciplines and bring synthesis to the material learned during the first seven semesters of studies.

### **2.1 Institutional Factors**

The BS in Mathematics and Economics is in tune with the academic priorities of the University of Delaware. It expands its offerings by adding an excellent undergraduate course of study; it innovates by offering a non-traditional course of study for students whose goals are graduate studies in Economics; it is compatible with the University focus on students and their needs; and it fosters collaboration between different departments and colleges within the University in its educational mission.

The program was originally planned and developed by the Departments of Economics and Mathematical Sciences. The recognition that the mathematical background needed for graduate studies in Economics is beyond that normally acquired by undergraduates in Economics, and that the Economics background needed for the same studies was beyond that normally acquired by undergraduates in Mathematics or Engineering lead the two departments to designate a committee of representatives of both disciplines to discuss the possibility of offering an undergraduate major that would be well-suited for students with that goal.

### **2.2 Student Demand**

Based on the enrollment figures for the four years of existence of the program on a provisional basis, it is expected that the BS in Mathematics and Economics will continue to attract more qualified students in years to come. Currently, the number of students in this major is about the same as the number of students in the BS in Mathematics. In May 2005, the number of graduates in this major exceeded the number of graduates in the other three bachelors programs offered in Mathematical Sciences (BS in Math, BA in Math and BA in Math Education).

### **2.3 Transferability**

The flexibility built-in the program facilitates students in mathematics, engineering and business to transfer to the program during the first two years of studies at UD, without severe penalty in time for graduation, in addition to students who enroll at the University in that program.

### **2.4 Other factors**

The lack of similar programs in the region, and the strength and collaboration of both departments involved, make this new major unique. Undergraduate research under co-advisement of economists and mathematicians is being planned for the near future.

## **3 Enrollment, Admissions and Financial Aid**

There is no enrollment limit for the BS in Mathematics and Economics. The clientele for this program is not expected to be much larger than for a typical BS in Mathematics. The admission criteria are the same as for the BS in Mathematics. As stated in Section 2.3 above, the program is flexible enough to allow students to transfer into it, provided they are capable of completing the requirements for the major.

The table below shows enrollment by semester. Note that the data reflects students officially in the major who took a MATH course during the semester. Some students would not be taking any MATH courses during some particular semesters, thus the fluctuations in the numbers. Since there is frequent change of majors, some academic dismissals and students who leave the University, the actual number of students in a particular program each semester is not very precise, but the table does give a close estimate to those numbers. Since its appearance in the 200-2001 Catalog, the program has graduated 17 students. In 2005 the Department of Mathematical Sciences graduated 26 students with bachelors degrees; the largest number, 9, was in Math and Economics.



2000 F	1	2001 S	2
2001 F	11	2002 S	3
2002 F	19	2003 S	5
2003 F	20	2004 S	4
2004 F	28	2005 S	4
2005F	34		

#### 4 Appendices

Attached are a letter of support from the Department of Economics, a letter of support from the Dean of Arts and Sciences, the original proposal for the program approved by the Faculty Senate on a provisional basis, and the minutes of the Faculty Senate meeting that approved the program.

## UNIVERSITY FACULTY SENATE

### Resolution

Whereas many students wish to obtain a degree in Economics with a strong background in Mathematics, and

Whereas rigorous study of both disciplines is solid preparation for graduate school in either Economics or Mathematics, and

Whereas the Department of Economics (College of Business and Economics) and the Department of Mathematical Sciences (College of Arts and Sciences) have collaborated enthusiastically in offering this program, and

Whereas the program has proved successful in attracting good students, and it has fulfilled the goals set forth when it was approved on a provisional basis, and

Whereas this program does not require additional resources in order to run successfully, be it therefore

Resolved that the BS major in Mathematics and Economics be granted permanent status in the College of Arts and Sciences.



## DEPARTMENT OF ECONOMICS MEMORANDUM

General Information: 831-2563  
Undergraduate Programs: 831-2564  
Graduate Programs: 831-2566

Facsimile: 831-6968  
Chair: 831-1907  
Office: 406 Purnell

**DATE:** October 13, 2004  
**TO:** Gilberto Schleiniger  
**FROM:** Saul D. Hoffman, Chair, Department of Economics  
*Saul D. Hoffman*  
**RE:** Permanent Approval of Mathematical Economics Major

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I understand that the B.S. in Mathematical Economics is being considered for permanent status. On behalf of the economics department, I am pleased to offer my very strong support for this program. It is a natural collaboration between our two departments, reflecting the need of top economics students to receive strong training in mathematics and the interest of many mathematics students in an applied area. If this program did not already exist, I would be initiating discussions with you to establish it. There is no question in my mind that it is highly beneficial to the students and to our two departments.

We have been delighted by the strong students that the program has attracted. One indication of this is the warm reception given to our course, ECON426, Mathematical Economics. This course had not been offered for many years, until I revived it two years ago to accommodate Math-Econ students and some of our students. It is now an annual fixture on our spring calendar, regularly drawing 20 students to a very challenging course. Prof. Stockman, who teaches this course, is very enthusiastic about the performance of his students. The Math-Econ students are also heavily represented in our other challenging courses.

In sum, I believe the program is an appropriate one and is working effectively.



COLLEGE OF ARTS AND SCIENCES

OFFICE OF THE DEAN

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**MEMORANDUM**

**To:** Faculty Senate

**From:** Tom Apple, Dean, College of Arts and Sciences

A handwritten signature in cursive script that reads "Tom Apple".

**Subject:** Approval of BS in Mathematics and Economics

I wish to express my support for the BS in Mathematics and Economics, a joint program administered by the College of Arts and Sciences and offered by the Department of Economics in the College of Business and Economics and the Department of Mathematical Sciences. The program has run for four years on provisional status, and the involved departments now seek permanent status for the degree program. The program has been extremely successful at attracting students and promoting collaboration between the two departments offering it. In fact, the Mathematics and Economics major could serve as a model for future joint majors. I urge the Faculty Senate to approve adoption of the BS in Mathematics and Economics.

To: Faculty Senate Committee on Undergraduate Studies

From: East Asian Studies Program Committee

Date: February 20, 2006

Re: Response to Permanent Status Program Review Report

The report of the Program Review Committee, consisting of Dr. Charles Pavitt and Dr. Peter Weil, is in general agreement with the East Asian Studies' (EAS) view of itself. The review is positive regarding the Program's goals and implementation of those goals. It also commends EAS on its contribution to the overall academic mission of the University of Delaware. The EAS Program Committee further agrees with the review's conclusion that the program is poised to grow substantially, but that such growth will require the dedication of resources for scholarships, faculty, and support staff.

The review identifies three areas of weakness. The first concerns the need to hire more faculty to teach a broader range of courses. Keeping in mind that EAS does not hire faculty, it has been very successful at encouraging the hiring of faculty by the various academic departments. In consequence, EAS is already offering considerable breadth and depth. Despite a concentration in East and Northeast Asia, Southeast and Central Asia also figure prominently in the Program's offerings. The review suggests that Indonesia, the largest Muslim nation in the world, merits coverage and is currently left out. This is not the case, as two Political Science courses devote significant and substantive sections to this country. Come next September, Indonesia, as well as other Southeast Asian nations, will gain additional attention with the new tenure-track hire in Anthropology. Still, more faculty resource in this area would greatly enhance the curriculum. The Program Committee would also wish to underscore that both domestic and international migration issues are covered in EAS courses, which directly address cultural and ethnic diversity issues in the United States. Korea is the one major country that the current EAS curriculum does not cover in a significant manner. All in all, EAS offers a rich and substantive area studies major for University of Delaware students.

The second area of weakness relates to financial support for experiential learning, particularly training in East Asia. The third area of weakness concerns the lack of administrative staff support. The EAS Program Committee would like to add a fourth, namely, the absence of space, which, practical purposes aside, would give the Program added identity and presence on campus.

The EAS Program Committee views these areas of weakness as programmatic needs, especially if it is to elevate itself to the next level of excellence. It therefore looks forward to working with the College and University Administration in developing means and resources to address them. Ensuring continuity in teaching and administration with limited resources has been a characteristic of the Program since its inception. Additional support from the University that would institutionalize administrative support and guarantee continuity in faculty lines would be most welcome.

In general the EAS Program Committee finds the review to be a ringing endorsement of the program and its accomplishments over the last six-and-a-half years (since September 1998). The U.S. Department of Education, in awarding the Title VI Grant, notes the enthusiasm of the EAS faculty, its quality, and its leadership. We believe that the review and all available evidence unequivocally support the granting of permanent status to the East Asian Studies Program Major.