T · H · E
OHIO
STATE
UNIVERSITY

**Department of Computer
Science and Engineering**

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May 10, 2008

Prof. David Andereck
Chair, MPS Curriculum Committee

Dear Prof. Andereck:

I am writing in support of the *applied discrete math track* for math majors interested in discrete math and computing that the Mathematics Department has proposed. Over the last few years, many math majors have taken a number of CSE courses; several of them have completed our minor and, indeed, many have gone on to join our graduate program. The proposed track would provide a structured set of courses for such students including an appropriate combination of discrete math courses and the CIS Minor program.

Hence we strongly endorse the proposed track. If you have any questions, please call or email me.

Thank you and best wishes.

Sincerely,

Neelam Soundarajan
Chair, Undergrad Studies Committee, CSE Dept.

cc: Prof. Bruce Weide, Assoc. Chair, CSE Dept.

May 21, 2008

Dr. Chunsheng Ban
Department of Mathematics
The Ohio State University
100 Math Tower
231 West 18th Avenue
Columbus, OH 43210-1174

Dear Dr. Ban:

Over the last several months, the Nationwide Quantitative Risk Management (QRM)
group has collaborated quite closely with you to provide your students with a basic
understanding of derivative mathematics and financial engineering. I am taking this
opportunity to summarize many of our conversations and explain why this field of study
is vital to the insurance industry.

The insurance industry's need for talented individuals trained in derivative mathematics
arises from the ubiquity of variable annuity guarantees. Variable annuities are analogous
to mutual funds (with certain tax advantages) with associated performance guarantees
that mix insurance and financial risk. In concept, these guarantees can look like:

- If your account has lost value after five years, we will replace the value lost
- If you die, your beneficiaries will receive the highest account value ever attained
  over the life of the contract, even if the current account value is less
- If you withdraw money following a set lifetime schedule, we will continue the
  payout schedule if your account is ever exhausted

These risks are different from traditional actuarial risks because they are not diversifiable.
When the financial markets decline, every single financial guarantee an insurer has
written becomes more valuable. Unlike more traditional life insurance risk, writing a
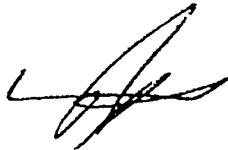larger portfolio only makes the risk concentration worse.

Obviously a different mathematical toolkit is needed to manage financial guarantees.
And there is tremendous demand for actuaries that understand the techniques for valuing
and managing both insurance and financial risk, at Nationwide and in the broader
industry. The key qualifier however is "both". There are several respected academic
programs that teach actuarial science or financial engineering, but none that bring both
concepts together. But facility with both paradigms is required to manage guarantees that
simultaneously contain both insurance and financial elements.

You have described to me an undergraduate course outline that includes:

- Probability and statistics
- Differential equations
- Numerical methods
- Accounting, finance, and interest theory (consistent with Exam FM)
- Financial economics (consistent with Exam MFE)
- Derivative mathematics (consistent with Shreve, "Stochastic Calculus for Finance")

This coursework will provide a very strong backbone that bridges both the actuarial and financial engineering disciplines. Students completing this course will be well prepared for advanced study and entry-level positions in this field. Presently, we encounter few entry-level candidates with this breadth of training and are encouraged by the Mathematics Department's commitment to filling this industry need.

Warm Regards,

Daniel Heyer
Associate Vice President, Quantitative Risk Management
Nationwide Financial Services

Biomedical Informatics   3190 Graves Hall
333 West 10th Avenue
Columbus, OH 43210
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Medical Center

October 29, 2008

Dear Dr. Friedman
Your proposed major in biological mathematics is well conceived and does not overlap with any curriculum we are teaching or planning in Biomedical Informatics. I concur that it should be enacted.

In fact we hope that your coursework such as "Advanced ODE/Dynamical Systems" and "Discrete Modeling" will prepare students to enter graduate programs and postdoctoral research. These areas are key elements to the work we propose in the OSU-MIDAS center for computational modeling of global infectious diseases threats.

Sincerely
Daniel Janies, Ph.D.
Associate Professor
Daniel.Janies@osumc.edu

THE OHIO STATE UNIVERSITY

Department of Evolution, Ecology and Organismal Biology

College of Biological Sciences
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October 29, 2008

Dr. Avner Friedman
Department of Mathematics
The Ohio State University
CAMPUS

Dear Dr. Friedman,

The EEOB Curriculum Committee has reviewed the proposal for a bio-math track in the mathematics major. The Committee is fully supportive of this proposal and considers such a track to be an important opportunity for undergraduate students seeking a strong foundation in both mathematics and biology. We feel that the EEOB classes listed as required or elective courses for the track are appropriate, and may in the future suggest additional EEOB courses that could contribute to the program.

Sincerely,

Thomas E. Hetherington, Chair
EEOB Curriculum Committee

Division of Infectious Diseases
Department of Internal Medicine
Center for Microbial Interface Biology

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edu/infectiousdiseases
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The Ohio State University Medical Center

October 31, 2008

Dear Professor Friedman:

As director of OSU's Center for Microbial Interface Biology and director of the Division of Infectious Diseases in the Medical School, I am writing in support of the bio-math track for math majors interested in applications of mathematics to the biological and medical sciences, which has been proposed by the Department of Mathematics. I foresee that this program of courses will be attractive to a number of students either seeking a mathematically oriented pre-medical track or seeking a double major in mathematics and some sub-discipline of the biological sciences related to infectious diseases, microbial pathogenesis and biodefense. The proposed track would provide a structured set of courses for such students, including an appropriate mix of mathematics courses and biology courses.

Hence we strongly endorse the proposed track. If you have any questions, please feel free to contact me.

Sincerely,

Larry S. Schlesinger, M.D.
Samuel Saslaw Professor
Director, Division of Infectious Diseases and the Center for Microbial Interface Biology
Associate Director, Medical Scientist Program

From: solomon@math.ohio-state.edu
Subject: [Fwd: Re: applied math option in major math program]
Date: Tue, February 17, 2009 1:20 pm
To: solomon@math.ohio-state.edu

Subject: Re: applied math option in major math program
From: "D. A. Mendelsohn" <mendelsohn.1@osu.edu>
Date: Thu, January 22, 2009 1:44 pm
To: "baker" <baker@math.ohio-state.edu>
Cc: kinzel.1@osu.edu
    srinivasan.3@osu.edu

Greg,
Please let this e-mail serve as a letter of
concurrence for the overall concept of the
Applied Math option for the Math Major, but
specifically with the Dynamics Applications Area
which includes Mech Eng 410, 430, 501, 502, 503,
504, 731, 734 and 735. The 400 and 500 level
courses represent a very strong, challenging and
coherent specialization in theoretical
mechanics. The Undergraduate Studies Committee
endorses the proposal and will waive (on an
individual basis) the prerequisite for 501 which
requires enrollment as an Engineering Major for
students in this Area of the Option.
Please let me know if you need anything further from us.
Dan Mendelsohn, Chair
Undergraduate Studies Committee
Dept. of Mechanical Engineering

From: baker@math.ohio-state.edu
Subject: [Fwd: Re: applied option for math grads]
Date: Wed, February 4, 2009 7:41 pm
To: solomon@math.ohio-state.edu

---------------------------- Original Message ----------------------------
Subject: Re: applied option for math grads
From: "Christopher M. Hadad" <hadad@chemistry.ohio-state.edu>
Date: Wed, February 4, 2009 6:35 pm
To: baker@math.ohio-state.edu

>Thank you for your help in correcting and improving the applied math option
>in the undergraduate math program. I believe we have made all the changes
>you suggest.
>
>The Department is now ready to forward the revised program for approval at
>the College level. We would appreciate a letter of support. If there are
>any questions or concerns please don't hesitate to contact me.
>
>Greg Baker
>
>Attachment converted: CMH_HD:appmath.doc (WDBN/«IC») (004F27D2)

Dear Greg,

With this email, I offer concurrence by Chemistry on your proposed
applied mathematics option for the undergraduate math program.

If you need further confirmation, please let me know.

Best regards,

Christopher

Vice Chair for Undergraduate Studies/Chemistry
(614) 292-1204

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Subject: Proposed Math Major Track in Applied Math

COMMUNICATION
Department of Electrical and
Computer Engineering

Date: February 17, 2009

From: Betty Lise Anderson, Curriculum

Committee Chair

To: Prof. Baker

Cc: Prof. Solomon (Math), Prof. Klein (ECE), Prof. Valco ·
(ECE)

The Department of Electrical Engineering Curriculum Committee has reviewed your proposal for an Applied Math Option for math majors. We are in favor of such a track.

We make the following observations: In the "applications" section of the proposal, in which a student must take a minimum of nine credit hours in a coherent sequence of courses, there is track called "Digital Signal/Image Processing." It starts with a sequence of courses
- ECE 205 (Circuit Analysis)
- ECE 351 (Systems I)
- ECE 352 (Systems II).

The course ECE 352, however, currently has ECE 301 (Analysis and Design in Circuits and Electronics) as a prerequisite. In discussing this with respect to your proposal, we felt that a math student with prior knowledge of linear algebra and LaPlace Transforms would probably be able to take ECE352 without ECE 301 without a problem; ECE 351 covers "Laplace transform; frequency response and Bode plots; Z-transforms; state variables, state equations; computer-aided analysis," but applies them to circuits as examples. Thus, we felt that we could allow math students into 352 without taking 301, but we'd like to require that they get our departmental permission (mostly to avoid our own students trying to skip ECE301).

The other issue with this sequence is that ECE 205 (Circuit Analysis) currently requires admission to the ECE department. Again, here, we are happy to allow math students in with permission of our department.

Next in the Applied Math proposal is a list of further courses for students "with a strong interest" in Digital Signal/Image Processing, consisting of
- ECE 600 (Introduction to Digital Signal Processing
- ECE 700 (Digital Signal Processing)
- ECE 707 (Digital Image Processing)

We might suggest adding
- ECE 706 (Medical Imaging)

We thought you might also consider a Controls/Systems sequence that could directly follow ECE 351*, so Math students could take any of these in their first nine credit hours:
- ECE 752 (Feedback Control Systems)
- ECE 754 (Nonlinear Systems)
- ECE 755 (Digital Control Systems)

Other Controls/Systems courses that could follow ECE 352 are
- ECE 551 (Introduction to Feedback Control Systems)
- ECE 750 (Linear System Theory)
- ECE 759 (Numerical Optimization for Electrical Engineers)

Next, you also have a proposed track in Radio Wave Propagation, consisting of
- ECE 205 (Circuit Analysis)
- ECE 311 (Electromagnetics I)
- ECE 312 (Electromagnetics II)

These are followed by, for students "with strong interest"
- ECE 711 (Radiation from Antennas)
- ECE 713 (Elements of Radio Wave Propagation)
- ECE 714 (Radar Systems)

You may also wish to consider allowing
- ECE710 (Microwave Circuits)
- ECE 716 (Optics with Laser Light)

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* Note that ECE 351 does *not* require ECE 301 so special permission is not needed here.

- ECE 719 Electromagnetic Field Theory I

If we can answer questions about these suggestions, pleas don't hesitate to ask.

From: "Richard Hughes" <hughes@mps.ohio-state.edu>
Subject: concurrence on Math Proposal
Date: Wed, February 25, 2009 4:09 pm
To: "Ron Solomon" <solomon@math.ohio-state.edu>

Dear Ron

Please accept this email as a positive concurrence on the part of the
Physics Department for the Applied Track in the new Math revision
proposal.

Note that the Physics "track" lists Physics 621/555/631 in the Sample
Schedule. These courses currently require Physics 416 as a
prerequisite. We see that Math 571 and Math 572 are required in this
option, and they both have a significant Matlab component. Students
will need to obtain permission of the instructor to take these courses
without Physics 416. We note that the applied option can be
successfully completed without these courses (621/555/631), so we do
not see this as a significant impediment.

Regards

Richard

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Richard E. Hughes
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breitenberger.1@osu.edu

Ron Solomon
Department of Mathematics
Ohio State University

Dear Ron:

The Bio-Math track proposed as part of the mathematics major revisions has been considered by the College of Biological Sciences Curriculum Committee. We feel that this track within the mathematics major will provide a wonderful opportunity for students interested in applications of mathematics to living systems to develop some breadth in the biological sciences in combination with their mathematics major. This track will be attractive to students either seeking a mathematically oriented pre-medical track or seeking a double major in mathematics and one of the areas in the biological sciences. The proposed track would provide a structured set of courses for such students, including an appropriate mix of mathematics courses and biological sciences courses.

Our committee had some questions about the inclusion or omission of specific courses in the proposed track, all of which have been promptly addressed in a way that strengthens the proposed track. Hence we strongly endorse the proposed track, and we look forward to recommending it to students interested in this very important area of study.

If you have any questions, please feel free to contact me.

Regards,

Caroline Breitenberger
Associate Dean, College of Biological Sciences
Director, Center for Life Sciences Education