



U N I V E R S I T Y of

UC 9743 08S

Page 1 of 11

COLLEGE OF NATURAL SCIENCES AND MATHEMATICS
OFFICE OF THE DEAN

RECEIVED MAR 28 2008

Memorandum

APPROVED MAY 14 2008

From: Ian Evans, Associate Dean, NS&M

To: Marsha Daly

Subject: New BS degree in Mathematical Biology

Date: 27 March 2008

The NS&M Curriculum Committee has reviewed and unanimously approved the proposed BS degree in Mathematical Biology. I am submitting a copy of the proposal for review by the Undergraduate Council. Please let me know if you have any questions.

Administrative Information

1. Institution: The University of Houston

2. Program Name: Bachelor of Science in Mathematical Biology

3. Proposed CIP Code: 30.0101.0102

4. Brief Program Description: The proposed program is a Bachelor of Science degree requiring ^{59¹}58 combined hours in Mathematics and Biology/Biochemistry. These include 12 advanced hours in Mathematics, 18 advanced hours in Biology/Biochemistry, and an additional 6 hours of advanced interdisciplinary Math/Biology courses. The total number of hours for the degree is 122. All university core requirements and state-mandated courses are included.

5. Administrative Unit: The program will be administered by the College of Natural Science and Mathematics. Instructional duties and faculty advising functions will be carried out by faculty in the departments of Mathematics and Biology/Biochemistry.

6. Proposed Implementation Date – Fall 2009

7. Contact Person – Provide contact information for the person who can answer specific questions about the program:

Name: Dr. Jeffrey Morgan
Dr. Stuart Dryer

Title: Professor and Chair, Department of Mathematics
Professor and Chair, Department of Biology and Biochemistry

E-mail: jmorgan@math.uh.edu
sdryer@uh.edu

Phone: (713)743-3500
(713)743-2697

Program Information

I. Need

Note: Complete I.A and I.B only if preliminary authority for the program was granted more than four years ago. This includes programs for which the institution was granted broad preliminary authority for the discipline.

- A. Job Market Need – The formidable challenges and potential breakthroughs currently emerging in biology, medical research, genomics, and proteomics will strongly influence mathematical innovation in the 21st century. As recognized by the NSF, there is currently a need to educate professionals who will be able to work at the interface of these rapidly evolving fields and applied mathematics.

The University of Houston is four miles from the Texas Medical Center, one of the most important centers of biomedical research in the world. It includes eleven patient care institutions and fourteen academic and research institutions. Students graduating from the proposed program would naturally form an important source of applicants for graduate programs offered by those institutions. Advertising for graduate programs offered by the University of Texas Graduate School of Biomedical Sciences, Baylor College of Medicine, and the Texas A&M University Health Science Center emphasizes the desirability of a strong undergraduate background in biology, chemistry, physics and mathematics. Our proposed program includes heavy concentrations of coursework in all of those areas. In particular, UTMB offers Ph.D. programs in biomathematics and biostatistics for which graduates of the proposed program would be ideally suited. Our graduates would also be very well qualified to apply for medical school should they choose to do so.

The Society for Mathematical Biology maintains a list of undergraduate degree programs in mathematical biology or biomathematics. In Texas the only such program is an option for biological sciences in the Applied Mathematics Degree program at Texas A&M. The University of Houston has a unique opportunity to create a baccalaureate program in mathematical biology for the state of Texas.

- B. Student Demand – A survey of 234 mathematics majors was conducted by e-mail in Fall 2007. In it, the outlines of the proposed program were briefly described and respondents were asked if they would be or would have been interested in such a program. Typically of such surveys, the response rate was low. Among students who did respond, 75% said that they would be interested. Affirmative responses were remarkably enthusiastic about prospects for such a program.

(20) responses

- C. Enrollment Projections – Use this table to show the estimated cumulative headcount and full-time student equivalent (FTSE) enrollment for the first five years of the program. (Include majors only and consider attrition and graduation.)

YEAR	1	2	3	4	5
Headcount	10	15	20	30	45
FTSE	10	15	20	30	45

II. Quality

- A. Degree Requirements – Use this table to show the degree requirements of the program. (Modify the table as needed; if necessary, replicate the table for more than one option.)

Category	Semester Credit Hours
General Education Core Curriculum (bachelor's degree only)	42
Required Courses	62 (excluding Core)
Prescribed Electives	3
Free Electives	15 13
TOTAL	122 120

OK
Cus is

- B. Curriculum – Use these tables to identify the required courses and prescribed electives of the program. Note with an asterisk (*) courses that would be added if the program is approved. (Add and delete rows as needed. If applicable, replicate the tables for different tracks/options.)

Prefix and Number	Required Courses	SCH
MATH 1431	Calculus I	4
MATH 1432	Calculus II	4
MATH 2433	Calculus III	4
MATH 2331	Linear Algebra	3
MATH 3331	Differential Equations	3
MATH 3338	Probability	3

New Program Request Form for
Bachelor's and Master's Degrees
Page 4

MATH 3339	Statistics	3
MATH	Mathematics Elective (4000-level)	3
BIOL 1361:1362	Introduction to Biological Science	6
BIOL 1161:1162	Introduction to Biological Science Laboratory	2
BIOL 3301	Genetics	3
BIOL 3311	Genetics Laboratory	3
BCHS 3304	General Biochemistry I	3
BIOL 3306	Evolutionary Biology	3
BIOL 3324	Human Physiology	3
BIOL 4374	Cell Biology	3
*BIOL/MATH 4309	Mathematical Biology (new course)	3
*BIOL/MATH 4310	Biostatistics (new course)	3
CHEM 1331; 1332	Fundamentals of Chemistry	6
CHEM 1111; 112 112	Fundamentals of Chemistry Lab	2
CHEM 3331	Fundamentals of Organic Chemistry	3
CHEM 3221	Fundamentals of Organic Chemistry Lab	2
PHYS 1321	University Physics I	3
PHYS 1121	Physics Laboratory I	1
PHYS 1322	University Physics II	3
PHYS 1122	Physics Laboratory II	1

C. Faculty – Use these tables to provide information about Core and Support faculty. Add an asterisk (*) before the name of the individual who will have direct-administrative-responsibilities-for-the-program. *(Add and delete rows as needed.)*

Name of <u>Core</u> Faculty and Faculty Rank	Highest Degree and Awarding Institution	Courses Assigned in Program	% Time Assigned To Program
Kresimir Josic, Associate Professor of Mathematics	Ph.D. in Mathematics, Penn. State University	Existing courses, MATH 4310, 4311	20%
Ricardo Azevedo, Associate Professor of Biology/Biochemistry	Ph.D. in Biology, University of Edinburgh.	Existing courses, BIOL 4310, 4311	20%
Suncica Canic, Professor of Mathematics	Ph. D. in Mathematics, SUNY at Stony Brook	Existing courses, MATH 4310	20%
Dan Graur, John and Rebecca Moores Professor of Biology/Biochemistry	Ph.D. in Biology, University of Texas at Houston	Existing courses, BIOL 4310, BIOL 4311	20%
*Charles Peters, Associate Professor and Director of Undergraduate Studies, Mathematics	Ph.D. in Mathematics, Texas A&M University	Existing courses, MATH 4311	20%
*Jeffrey Morgan, Professor and Chair of Mathematics	Ph.D. in Mathematics, University of Houston	Existing courses, MATH 4310	20%
*Stuart Dryer, Professor and Chair of Biology/Biochemistry	Ph.D. in Biology, St. Louis University	Existing courses, BIOL 4310	20%
*Laurence Rapp, Instructional Associate Professor, Biology/Biochemistry	Ph.D. in Biology, Florida State University	Existing courses	20%
*Lawrence Williams, Instructional Associate Professor, Biology/Biochemistry	Ph.D. in Biology, University of Houston	Existing courses	20%

Note: All but two of the required courses in the program already exist. Responsibility for those courses is distributed among the combined faculties of the two departments.

- D. Library – Current library facilities and holdings are adequate to support the program.
- E. Facilities and Equipment – Presently available facilities and equipment are adequate to support the program.
- F. Accreditation – There is no specific disciplinary accreditation involved in the creation or maintenance of this degree program.

III. Costs and Funding

Five-Year Costs and Funding Sources - Use this table to show five-year costs and sources of funding for the program.

Five-Year Costs		Five-Year Funding	
Personnel ¹	\$60,000	Reallocated Funds	\$0
Facilities and Equipment	\$0	Anticipated New Formula Funding ³	\$40,000
Library, Supplies, and Materials	\$0	Special Item Funding	\$0
Other ² (Administrative)	\$20,000	Other ⁴ (Tuition & fees)	\$40,000
Total Costs	\$80,000	Total Funding	\$80,000

1. Report costs for new faculty hires, graduate assistants, and technical support personnel. For new faculty, prorate individual salaries as a percentage of the time assigned to the program. If existing faculty will contribute to program, include costs necessary to maintain existing programs (e.g., cost of adjunct to cover courses previously taught by faculty who would teach in new program).
2. Specify other costs here (e.g., administrative costs, travel).
3. Indicate formula funding for students new to the institution because of the program; formula funding should be included only for years three through five of the program and should reflect enrollment projections for years three through five.
4. Report other sources of funding here. In-hand grants, "likely" future grants, and designated tuition and fees can be included.

Signature Page

1. Adequacy of Funding – The chief executive officer shall sign the following statement:

I certify that the institution has adequate funds to cover the costs of the new program. Furthermore, the new program will not reduce the effectiveness or quality of existing programs at the institution.

Chief Executive Officer

Date

2. Board of Regents or Designee Approval – A member of the Board of Regents or

designee shall sign the following statement:

On behalf of the Board of Regents, I approve the program.

Board of Regents (Designee)

Date of Approval

3. Board of Regents Certification of Criteria for Commissioner of Assistant Commissioner Approval – For a program to be approved by the Commissioner or the Assistant Commissioner for Academic Affairs and Research, the Board of Regents or designee must certify that the new program meets the eight criteria under TAC Section 5.50 (b): The criteria stipulate that the program shall:

- (1) be within the institution's current Table of Programs;
- (2) have a curriculum, faculty, resources, support services, and other components of a degree program that are comparable to those of high quality programs in the same or similar disciplines at other institutions;
- (3) have sufficient clinical or in-service sites, if applicable, to support the program;
- (4) be consistent with the standards of the Commission of Colleges of the Southern Association of Colleges and Schools and, if applicable, with the standards or discipline-specific accrediting agencies and licensing agencies;
- (5) attract students on a long-term basis and produce graduates who would have opportunities for employment; or the program is appropriate for the development of a well-rounded array of basic baccalaureate degree programs at the institution;
- (6) not unnecessarily duplicate existing programs at other institutions;
- (7) not be dependent on future Special Item funding
- (8) have new five-year costs that would not exceed \$2 million.

On behalf of the Board of Regents, I certify that the new program meets the criteria specified under TAC Section 5.50 (b).

Board of Regents (Designee)

Date

Bachelor of Science in Mathematical Biology

The general requirements, including university core curriculum and college requirements, shall apply. By virtue of the interdisciplinary nature of the program,

students who complete the requirements for the B.S. degree in Mathematical Biology have satisfied the capstone requirement of the College of Natural Science and Mathematics. Academic advising for students pursuing the Bachelor of Science in Mathematical Biology is provided by the Office of the Dean.

Students who choose to major in Mathematical Biology must complete the following requirements in addition to the special requirements for the Bachelor of Science degree:

Biology/Biochemistry	Hours
BIOL 1361, 1362, 1161, 1162, 3301, 3311, 3306, 3324, 4374	23
BCHS 3304	3
 Mathematics	
MATH 1431, 1432, 2433, 2331, 3331, 3338, 3339	24
A minimum of 3 semester hours of 4000-level mathematics	3
 Interdisciplinary courses	
BIOL/MATH 4309 and 4310	6
 Chemistry	
CHEM 1331, 1332, 1111, 1112, 3331, 3221	13
 Physics	
PHYS 1321, 1121, 1322, 1122	8

**Bachelor of Science in Mathematical Biology
Suggested Program**

First Year**Fall Semester** **Hours**

MATH 1431	4
ENGL 1303	3
HIST 1376 or 1377	3
POLS 1336	3
BIOL 1361	3
BIOL 1161	1

Total 17

Spring Semester **Hours**

MATH 1432	4
ENGL 1304	3
HIST 1378 or 1379	3
POLS 1337	3
BIOL 1362	3
BIOL 1162	1

Total 17

Second Year**Fall Semester** **Hours**

MATH 2433	4
MATH 2331	3
CHEM 1331	3
CHEM 1111	1
PHYS 1321	3
PHYS 1121	1

Total 15

Spring Semester **Hours**

MATH 3331	3
MATH 3338	3
CHEM 1332	3
CHEM 1112	1
PHYS 1322	3
PHYS 1122	1

Total 14

Third Year

Fall Semester

	Hours
MATH 3339	3
BIOL 3301	3
CHEM 3331	3

CHEM 3221	2
BIOL 3321	3

Total 14

Spring Semester

	Hours
BCHS 3304	3
BIOL 3306	3
MATH Elective (4000-level)	3
Elective*	3
Humanities Core	3

Total 15

Fourth Year

Fall Semester

	Hours
BIOL 3324	3
BIOL/MATH 4309	3
BIOL 4374	3
Social Science Core	3
Visual and Performing Arts Core	3

Total 15

Spring Semester

	Hours
BIOL/MATH 4310	3
Electives*	12

Total 15

Total Semester Hours 122

*Students who plan to apply for medical school should include CHEM 3332 and CHEM 3222 in their elective hours.