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: Gilberto Schleiniger phone number: 831-1872

Action: Add major

(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: 07F

(use format 04F, 05W)

Current degree

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

Proposed change leads to the degree of: BS

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

Proposed name: Mathematics Education

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:

(Attach your Graduate Program Policy Statement)

Graduate Program of Study:

(Example: Animal Science: MS Animal Science: PHD Economics: MA Economics: PHD)

Graduate minor / concentration:

List program changes for curriculum revisions:

List new courses required for the new or revised curriculum:
(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")

No new courses are required by the new curriculum.

Other affected units:
(List other departments affected by this new or revised curriculum. Attach permission from the affected units. If no other unit is affected, enter "None")

No other units are affected .

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

Mathematically talented students who want to train as math teachers also want the option of pursuing graduate education in mathematics after teaching in high schools for a few years. In addition, high school mathematics teachers with mathematical knowledge beyond that required for the state certification would be an asset in our high schools.

The XMS degree (BA in Math Education) does not have room to fit in more mathematics courses due to the breadth and language requirements of the College of Arts and Sciences for the BA degree; so students do not have room in their schedules to take advanced mathematics courses beyond those required for state certification in Math Education.

We propose a BS in Mathematics Education which will retain all the Math and Education requirements of the XMS degree, and almost all the Math requirements of the BS in Mathematics, while reducing the College group requirements, and eliminating the language requirements.

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 present curriculum.)

- **University Requirements**
  ENGL 110 Critical Reading and Writing …… 3
  (minimum grade C-)

  First Year Experience …… 0-4

  Discovery Learning Experience …… 3

  Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content …… 3

- **College Requirements**
  Writing (minimum grade C-) …… 3
  Second writing course taken after completion of 60 credit hours.

- **Breadth Requirements**
  Eighteen credits from Groups A, B and C with a minimum of six credits from each group.

  Croup A …… 6

  Group B …… 6

  Group C …… 6

- **Major Requirements**
  A grade of C- or better is required for major courses and related work.

Mathematics Section

MATH 210 Discrete Mathematics I ……. 3
MATH 242 Analytic Geometry and Calculus B ……. 4
MATH 243 Analytic Geometry and Calculus C ……. 4
MATH 245 An Introduction to Proof ……... 3
MATH 302 Ordinary Differential Equations …….. 3
MATH 308 Historical Developments of Mathematical Concepts and Ideas …… 3
MATH 349 Elementary Linear Algebra …….. 3
MATH 350 Probability Theory and Simulation Methods …….. 3
MATH 450 Mathematical Statistics …… 3
MATH 451 Abstract Algebra I …… 3

One of the following modeling classes …….. 3
MATH 512 Contemporary Applications of Mathematics
MATH 518 Mathematical Models and Applications

MATH 540 College Geometry: A Historical Approach …… 3

One course from the following list …… 3
MATH 315 Discrete Mathematics II
MATH 401 Introduction to Real Analysis
MATH 503 Advanced Calculus for Applications
MATH 508 Introduction to Complex Variables and Applications

Computer and Information Sciences Section

Either CISC 105 (for those with no previous equivalent experience) or CISC 181. 3

Science Section

A two-semester, 8 credit sequence of laboratory science (courses designed for non-majors in a discipline are not appropriate, except for CHEM 103 --104) …. 8

Professional Development Section

MATH 279 Problem Solving Strategies I …… 1
MATH 379 Problem Solving Strategies …….. 1
MATH 380 Approaches to Teaching Mathematics ……..…….. 3
MATH 382 Student Teaching Seminar in Secondary Math …….. 2

EDUC 400	Student Teaching	9
EDUC 413	Adolescent Development and Educational Psychology	4
EDUC 414	Teaching Exceptional Adolescents	3
EDUC 419	Diversity in Secondary Education	3
EDUC 420	Reading in the Content Areas	1

Nine additional credits in mathematics or in related disciplines at the 300 level or above 9
Courses not approved for math majors cannot be counted towards these 9 additional credits. Non mathematics courses can be in CISC, ECON, PHYS and STAT from an approved list maintained by the Department of Mathematical Sciences.

Credits to total a minimum of 124

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

Department Chairperson PETER MONK Peter Monk Date 10/23/06

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 Programs & Planning_____ Date_____

Provost _____ Date_____

Board of Trustee Notification _____ Date_____

Revised 11/03/04 /khs

Proposal for a Bachelor of Sciences in Math Education

G. Schleiniger

October 20, 2006

1 Description

The proposed new degree is a Bachelor of Science in Mathematics Education (BSME). The goal of the proposed major is to provide an alternative to those mathematically talented students who want to be trained as math teachers, but who also want the option of pursuing graduate education in mathematics after teaching in high schools for a few years. Graduates of this new major will also be an asset in our high schools, since they will have mathematical knowledge beyond that required for the state certification. The proposed curriculum has enough flexibility to allow students to pursue a minor in another discipline such as in the sciences, economics, foreign languages, computer and information science, etc., which can prepare them for the demands of the job market in secondary education, where ability to teach more than one discipline is highly valued.

2 Rationale and demand

2.1 Institutional factors

The proposed new major is compatible with the academic priorities of the University in that it will provide an alternative to an existing high quality major in secondary math education for those students who may wish a stronger math background in preparation for a future graduate program in mathematics, or who may wish to pursue a minor in another discipline in preparation for teaching an additional subject in middle and high school. The new major requires no additional resources, and it can be implemented without any adverse effect on any other program or department.

We propose a BS in Mathematics Education which will retain all the Math and Education requirements of the XMS (BA in Secondary Math Education) and almost all the Math requirements of the BS in Mathematics, while reducing the College breadth requirements, and eliminating the language requirements.

2.2 Student demand

It is estimated that about 30–50% of the students in secondary math education will choose the BS degree, rather than the BA. It may also make the program in secondary math education at UD more attractive to prospective students, as it would offer an alternative to those mathematically talented students who may desire a more mathematically demanding curriculum as preparation for teaching AP Calculus and AP Statistics, as well as for future graduate studies in mathematics.

2.3 Transferability

Some current students in the XMS program may transfer to the new major. Engineering and science students may also transfer to the BSME program. These latter students should find it easier to complete the program without too much delay, as the BSME curriculum is more compatible with those of engineering or science than the XMS program.

2.4 Regional, state, and national factors

As the principal institution of higher education in the State of Delaware training secondary math teachers, our University will be adding an alternative program sought by current and future students seeking a career as high school teachers. Even if similar programs exist at other universities in the region, of which we are not aware, it is still desirable to add to the offerings of the University of Delaware in this extremely important field.

The curriculum is designed to meet the needs of mathematically talented students who want to be trained as math teachers, but who also want the option of pursuing graduate education in mathematics after teaching in high schools for a few years. The curriculum also has enough flexibility to allow students to pursue a minor in another discipline such as in the sciences, economics, foreign languages, computer and information science, etc., which can prepare them to teach another middle or high school subject. The current XMS program does not have room to fit in more mathematics courses due to the College of Arts and Sciences breadth and language

requirements for the BA degree; so students do not have the time in their schedules to take advanced mathematics courses beyond those required for state certification in Math Education.

3 Enrollment, Admissions and Financial Aid

3.1 Enrollment

There is no enrollment limit for the BS in Mathematics Education. The clientele for the combined BSME and XMS is not expected to be much larger than that for the existing XMS.

3.2 Admission requirements

The admission criteria are the same as for the XMS.

3.3 Student expenses

Student expenses should be commensurate with those incurred by a typical XMS student.

4 Curriculum Specifics

The degree to be awarded is a bachelor of science. The curriculum requirements are consistent with University requirements for a baccalaureate degree, more specifically for a bachelor of science.

- **University Requirements**

  ENGL 110 Critical Reading and Writing (minimum grade C-) 3

  First Year Experience 0-4

  Discovery Learning Experience 3

  Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content 3

- **College Requirements**

  Writing (minimum grade C-) 3
  Second writing course taken after completion of 60 credit hours.

- **Breadth Requirements**
  Eighteen credits from Groups A, B and C with a minimum of six credits from each group.

  Croup A 6
  Group B 6
  Group C 6

- **Major Requirements** (C- or better is required for major courses and related work.)

  Mathematics Section

  MATH 210 Discrete Mathematics I 3
  MATH 242 Analytic Geometry and Calculus B 4
  MATH 243 Analytic Geometry and Calculus C 4
  MATH 245 Introduction to Proof 3
  MATH 302 Ordinary Differential Equations 3
  MATH 308 Historical Developments of Mathematical Concepts and Ideas 3
  MATH 349 Elementary Linear Algebra 3
  MATH 350 Probability Theory and Simulation Methods 3
  MATH 450 Mathematical Statistics 3
  MATH 451 Abstract Algebra I 3
  MATH 540 College Geometry: A Historical Approach 3
  One of the following modeling courses 3
    MATH 512 Contemporary Applications of Mathematics
    MATH 518 Mathematical Models and Applications
  One course from the following list 3
    MATH 315 Discrete Mathematics II
    MATH 401 Introduction to Analysis
    MATH 503 Advanced Calculus for Applications
    MATH 508 Introduction to Complex Variables and Applications

Computer and Information Sciences Section

Either CISC 105 (for those with no previous equivalent experience) or CISC 181 Introduction to Computer Science 3

Science Section

A two semester, 8 credit sequence of laboratory science (courses designed for non-majors in a discipline are not appropriate, except for CHEM 103–104). 8

Professional Development Section

MATH 279 Problem Solving Strategies I 1
MATH 379 Problem Solving Strategies 1
MATH 380 Approaches to Teaching Mathematics 3
MATH 382 Student Teaching Seminar in Secondary Math 2

EDUC 400 Student Teaching 9
EDUC 413 Adolescent Development and Educational Psychology 4
EDUC 414 Teaching Exceptional Adolescents 3
EDUC 419 Diversity in Secondary Education 3
EDUC 420 Reading in the Content Areas 1

Additional Requirements

Nine additional credits in mathematics or in related disciplines at the 300 level or above 9
Courses not approved for math majors cannot be counted towards these 9 additional credits. Non mathematics courses can be in CISC, ECON, PHYS and STAT from an approved list maintained by the Department of Mathematical Sciences.

Electives in sufficient number to complete the minimum number of credits required for graduation.

Credits to total a minimum of 124

Observations:

1. The total number of credits from required courses in the list is 119, assuming the most frequent case of one credit (UNIV 101) for the First Year Experience. MATH 308, a required course, satisfies a Group B and the second writing requirement; EDUC 419, a required course, satisfies the multi-cultural requirement; and

EDUC 400, the required student teaching, should satisfy the Discovery Learning Experience. Thus, in effect, the required courses take up only 107 of the 124 credits, leaving 17 credits for free electives, or to count towards a minor in another discipline.

2. The table on the next page shows the differences in required courses for the proposed program, the BS in Mathematics, and the XMS major. The Group D requirement of the XMS major is not listed since it is automatically covered by required courses in all three majors.

5 Resources Available

5.1 Learning resources

The resources needed by the proposed BSME are the same as those needed by current majors in mathematical sciences. They all exist within the University, and there would be no adverse impact on those resources.

6 Resources Required

No new resources are needed.

7 Implementation and Evaluation

The new major will be part of the assessment plan of the Department of Mathematical Sciences. We also plan to keep track of the movements into and out of the major, as well as of graduating seniors, in order to evaluate the effectiveness of the program in meeting its goals.

8 Appendices

Attached is a copy of a memorandum of support from the University Council on Teacher Education.

BS in Math	**BS in Math Education (proposed)**	**BA in Math Education**
Foreign language		Foreign language
Groups A(6), B(6) and C(6)	A(6), B(6) and C(6)	A(12), B(9), C(9)
MATH 268		
MATH 302	MATH 302	MATH 302 optional
	MATH 308	MATH 308
MATH 512	MATH 512 or 518	MATH 512 or 518
†MATH 450 optional	MATH 450	MATH 450
†MATH 451 optional	MATH 451	MATH 451
†MATH 540 optional	MATH 540	MATH 540
8 credit lab science	8 credit lab science	PHYS 207
CISC 181 and 220	CISC 105 or 181	CISC 105 or 181
	MATH* & EDUC*	MATH* & EDUC*
15 credits** $\geq$ 300 level	12 credits** $\geq$ 300 level	

† Three courses to be chosen from a list of six.

* Professional development courses.

** Additional credits in MATH or related disciplines.