# Curriculum Proposal

## MATH 19-20 #10

<table>
<thead>
<tr>
<th>Packet Contents</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Summary</td>
<td></td>
</tr>
<tr>
<td>Course Modification</td>
<td></td>
</tr>
<tr>
<td>1.2 MATH 4760/5760 Topics in Applied Mathematics (3 credits); description change</td>
<td></td>
</tr>
<tr>
<td>Program Modification</td>
<td></td>
</tr>
<tr>
<td>1.5 Mathematics, B.S. major Applied Emphasis</td>
<td></td>
</tr>
<tr>
<td>1.9 Signatures</td>
<td></td>
</tr>
</tbody>
</table>
BSU Curriculum Forms

Form 1

Curriculum Modification Summary

College: Business, Mathematics and Science
Department: Mathematics and Computer Science
Proposer: Dr. Co Livingston
Proposer’s position: Professor of Mathematics
Describe the modification(s) you propose, and how it (/they) will work to students’ advantage. (This description and explanation will be included in Curriculum Report packets forwarded to the Faculty Senate.):

1. Modify the course description for MATH 4760/5760 to accurately reflect the topics we have taught for the past 8 years.
2. Modify the BS Mathematics – Applied Emphasis  
   (a) To increase the likelihood of exposure to statistical hypothesis testing.  
   (b) To encourage computer science majors to double major in mathematics by including CS 4752 Data Mining as an elective.  
   (c) To reflect past instances of allowing GEOG 4265 Spatial Analysis as an elective.

Modifications proposed (specify number of each):

_3 Course Modification(s) (form 2)
_____New Course(s) (form 3)
_____Course Drop(s) (form 4)
_3 Program Modification(s) (form 5)
_____New Program(s) (form 6)
_____Program Drop(s) (form 7)

The modifications affect (check):

_____Liberal Education
_1 Undergraduate Curriculum
_1 Graduate Curriculum (MATH 5760 is an elective)
_1 Teacher Licensure Program(s) (MATH 4760 is an elective)
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Form 2
Updated 9.19.15

Course Modification Form

MATH 4760 Topics in Applied Mathematics (3 credits)

Current Course Number(s):
   Undergraduate: MATH 4760
   Graduate: MATH 5760

Proposed Course Number(s), if different:
   Undergraduate:
   Graduate:

Current Course Title: Topics in Applied Mathematics
Proposed Course Title, if different:

Current Course Description: This course focuses on an advanced topic from applied mathematics. Possible foci include operations research, cryptography, computational science, and bioinformatics. May be repeated for credit with instructor permission. Prerequisite: MATH 2472. (Might not be offered every year.)

Proposed Course Description, if different: This course focuses on an advanced topic from applied mathematics. Possible topics include game theory, operations research, and cryptography. May be repeated for up to 6 credits with different topics. Prerequisite: MATH 2472. (Might not be offered every year.)

Current Credits: 3
Proposed Credits, if different:

Current Prerequisite(s):
   Undergraduate: MATH 2472 Calculus II
   Graduate: (none)

Proposed Prerequisite(s), if different:
   Undergraduate:
   Graduate:

1) Reason(s) for change(s): The change aligns with what we have actually taught as topics over the past 10 years.

2) May this modified course replace the current course for students remaining in the old curriculum? Yes ___x____ No ______ If not, please drop the current course and submit a new course form for the modification.
3) Do these modifications change any of the following? **For all Yes answers, please provide updated information on the next page.**

**Student Learning Outcomes**
- Yes ___X___ No _____

**Major Content Areas**
- Yes ___X___ No _____

**Projected Maximum Class Size (Cap)**
- Yes ______ No _x_____

**Note:**
The system did not have SLO’s or Major Content Areas indicated. Therefore, the following will be added.

**MCA**
Relevant to the topic under consideration:
1. Implement the mathematical modeling process:
   a. Create a model.
   b. Translate the model to a mathematical problem.
   c. Solve the mathematical problem.
   d. Reflect on the reasonableness and completeness of the result.
2. Apply and prove the principal theorems.

**SLO**
Learning outcomes
Students should be able to:
1. Understand general and specific strategies for mathematical modeling in the topic under consideration.
2. Analyze problems, discern structure and pattern and make conjectures in a variety of modeling contexts.
3. Apply analytic thinking to develop clear and valid arguments.
4. Communicate mathematical ideas and understanding effectively.
5. Appreciate the beauty and diversity of techniques relative to the topic under consideration.

For Math 5710 add: Exhibit advanced modeling and communication skills.

4) Current Course fee(s) per student: $
for:
Proposed Course fee(s) per student, if different: $
for:

5) Service Areas:
This course is a requirement or an elective in the programs/areas listed below. To locate where this course appears please search the online catalog, as follows:
   a) go to [http://www.bemidji.edu/academics/catalog/](http://www.bemidji.edu/academics/catalog/) and choose the most recent catalog(s),
   b) click on “Areas of Study, and Course Descriptions,”
   c) click on “PDF of Entire Catalog” in upper right,
d) press Ctrl F, and enter the prefix and number of the course(s) from this form.

Non-licensure programs:
Mathematics, B.S. major Actuarial emphasis (elective in emphasis)
Mathematics, B.S. major Applied emphasis (elective in emphasis)
Mathematics, B.S. major General emphasis (elective in emphasis)

Teacher Licensure programs:
Mathematics Education, B.S. major (Teacher Licensure) - elective in the
Applied Mathematics/Calculus Concentration

Liberal Education:

The above “service area” programs/departments were notified of this modification on
_Sep. 5_______ (date) by __in person in department meeting____ (mail, email, or phone).

Please check one of the items below:

___x___ No comments were received from other programs or departments within one week of the notification.

_______ Comments were received within one week of the notification, and are attached.
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Form 5

Program Modification Form

Program to be modified: Mathematics, B.S. major Applied Emphasis

List all proposed change(s): Changes to the allowable data analysis courses in this emphasis.

Reason(s) for the change(s): (a) To increase the likelihood of exposure to statistical hypothesis testing. (b) To encourage computer science majors to double major in mathematics by including CS 4752 Data Mining as an elective. (c) To reflect past instances of allowing GEOG 4265 Spatial Analysis as an elective.

Note: In order to avoid hidden prerequisites, if a course is being dropped from this program (but not from the entire curriculum), please check for which remaining courses may include this dropped course as a prerequisite. Course prerequisites may be found in the online catalog (http://www.bemidji.edu/academics/catalog/). Remedies for hidden prerequisites may be found under Curriculum Forms at (http://www.bemidji.edu/faculty_staff/faculty_association/forms/).

Note: If a course from another department/program was either added to or dropped from this program, please notify the chair/coordinator of that course's department/program and indicate the following: The course’s home department/program was notified of the addition or dropping of their course(s) on _________ (date) by __________________ (mail, email, or phone).

Please check one of the items below:

_____ No comments were received from other programs or departments within one week of the notification.

___x___ Comments were received within one week of the notification, and are attached.

Note: If this is a joint program, the signatures of both department chairs (and both deans, if different colleges) must be provided.

Alert: Attach a copy of the current program showing the marked changes.

Please copy the current program from the online catalog (http://www.bemidji.edu/academics/catalog/) and paste it into Word. Then use either the Track Changes feature under Tools, or the underline and strikethrough Font feature under Format. (Please note that the
Track Changes feature may be easily switched on and off by holding down the Ctrl+Shift+E keys.)

Current Program – tracking changes

Mathematics, B.S. major
Applied Emphasis

Note: If the student’s high school mathematics courses and/or the Mathematics Placement Test indicate a lack of readiness for calculus, the student will be placed in one of the following precalculus sequences: MATH 1470; or MATH 1170 and MATH 1180; or MATH 1170 and MATH 1470.

Required Credits: 40
Required GPA: 2.25

I REQUIRED CORE COURSES

COMPLETE THE FOLLOWING COURSES:

- MATH 2210 Discrete Mathematics (4 credits)
- MATH 2471 Calculus I (5 credits)
- MATH 2472 Calculus II (5 credits)
- MATH 2480 Multivariable Calculus (4 credits)
- MATH 3310 Linear Algebra (4 credits)

APPLIED EMPHASIS

SELECT AT LEAST 6 COURSES FROM THE FOLLOWING:

A. Complete three courses from the following list.

- CS 2322 Computer Science II (4 credits)
- MATH 2490 Differential Equations (4 credits)
- MATH 3710 Mathematical Modeling (3 credits)
- MATH 3720 Numerical Methods (3 credits)
- MATH 4410 Introduction to Analysis (3 credits)
- MATH 4760 Topics in Applied Mathematics (3 credits)
- STAT 2610 Applied Statistics (4 credits)
  or STAT 3631 Probability And Statistics I (4 credits)
- STAT 3610 Time Series Analysis (3 credits)
- STAT 3632 Probability And Statistics II (3 credits)

B. Complete 3 additional courses NOT previously taken above from the following list.
Proposed Program – clean copy

Mathematics, B.S. major
Applied Emphasis

Note: If the student’s high school mathematics courses and/or the Mathematics Placement Test indicate a lack of readiness for calculus, the student will be placed in one of the following precalculus sequences: MATH 1470; or MATH 1170 and MATH 1180; or MATH 1170 and MATH 1470.

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- MATH 4760 Topics in Applied Mathematics (3 credits)
- STAT 2610 Applied Statistics (4 credits)
- STAT 3610 Time Series Analysis (3 credits)
- STAT 3631 Probability And Statistics I (4 credits)
- STAT 3632 Probability And Statistics II (3 credits)
- CS 3752 Data Mining (3 credits)
- GEOG 4265 Spatial Analysis (3 credits)

Sept. 16, 2019, Comments from Dr. Jeff Ueland, Chair of Geography and instructor of Spatial Analysis.

Having a GIS class is ideal, but for the students from your program who have done this in the past, it has not been a huge issue. I have given students who need a bit of a help some tutorial exercises and work with them for a couple hours to get them where they can essentially make a map and handle data. At that point, most of the stuff they are learning is new to all students in the class so they seem to be able to keep up. So in short it I am supportive of the changes and would welcome students without gis into the class.

Best of luck on your revisions and let me know if I can be of any more assistance.
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Form 8
Updated: 09.18.15

Signatures

_C Livingston / Professor of Mathematics / 9.19.19

Proposer / Title / Date

_Marty Wolf / Mathematics & Computer Science / 9.19.19

Chair or Director / Department or Program / Date

Note: "All departmental recommendations [on curriculum] must be reviewed and approved by the department's faculty." --IFO/MnSCU Master Agreement 2009-2011, 20.A.3 (p. 80).

At this point, packet goes to Records Office/Curriculum Coordinator to be logged in to the Curriculum Proposal Progress Grid.

_Marilyn Yoder / Business, Mathematics and Sciences / 9.19.19

Dean / College / Date

Note: If proposal is sent back to the Proposer, please notify the Curriculum Coordinator. If approved, packet goes to Academic Affairs Office.