FAIRMONT STATE UNIVERSITY

MEMORANDUM

FINAL FACULTY SENATE APPROVAL ON APRIL 14, 2015.

TO: Faculty Senate

FROM: Jack Kirby JKIS

DATE: April 10, 2015

SUBJECT: Curriculum Proposal #14-15-29 REV #1

College of Science & Technology: MATH 2216

I recommend approval of the attached Curriculum Proposal #14-15-29 REV #1. The Curriculum Committee has passed this proposal for both 1st and 2nd readings. This proposal aims to remove MATH 2216, Discrete Math, from the math teaching specialization, grades 5-9.

C: Dr. Christina Lavorata
Dr. Donald Trisel
Dr. Mahmood Hossain
Dr. A. Dennine Larue
Dr. Susan Goodwin
Ms. Leslie Lovett
Ms. Cheri Varkonda

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FAIRMONT STATE UNIVERSITY

MEMORANDUM

TO: Curriculum Committee

FROM: Jack Kirby JRK

DATE: March 3, 2015

SUBJECT: Curriculum Proposal #14-15-29

College of Science & Technology: MATH 2216 Removal

I recommend approval of the attached Curriculum Proposal #14-15-29. This proposal aims to remove MATH 2216, Discrete Math, from the math teaching specialization, grades 5-9.

c: Dr. Christina Lavorata
Dr. Donald Trisel
Dr. Mahmood Hossain
Dr. A. Dennine Larue
Dr. Susan Goodwin
Ms. Leslie Lovett
Ms. Cheri Varkonda

PREPARING CURRICULUM PROPOSALS

INSTRUCTIONS

Draft your proposal in accordance with the guidelines below and the format shown on the following pages. Should any item under the several headings not pertain to your proposal, write N/A. **Number the second and subsequent pages of your proposal.**

Supply the preliminary information about the proposal as indicated below:

PROPOSAL NUMBER: Leave this space blank. A number will be assigned to the proposal by the Associate Provost.

SCHOOL: Enter the name of the College or School (e.g., *Liberal Arts*), Department (e.g., Language and Literature), and Program (e.g., English).

PREPARER/CONTACT PERSON: Enter the name of the person who prepared the proposal and his/her telephone extension number.

COPIES OF MEMOS SENT TO AFFECTED DEPARTMENTS: Attach these to the back of your proposal.

LETTERS OF SUPPORT FROM DEANS OF AFFECTED DEPARTMENTS: If the Curriculum Committee requests these letters, attach them to the back of your proposal.

DATE SUBMITTED: The Curriculum Committee meets on the fourth Tuesday of each month. **Proposals are due in the Office of the Associate Provost on or before the second Tuesday of the month.**

REVISION SUBMISSION DATE: If changes are required to the original proposal, enter the date the proposal was resubmitted.

IMPLEMENTATION DATE REQUESTED: Enter the first day of the semester (or summer term) and year in which the proposed curriculum change(s) would take effect.

CURRICULUM PROPOSAL (Submit one hard copy and an electronic copy to the Associate Provost by the second Tuesday of the month.)

Proposal Number: _____

School/Department/Program: College of Science & Technology/CSMP/Math

Preparer/Contact Person: Dennine LaRue and Susan Goodwin

Telephone Extension: X4621 and X4307

Date Originally Submitted: March 2, 2015

Revision (Indicate date and label it Revision #1, #2, etc.): Revison#1 4-10-15

Implementation Date Requested: August 17, 2015

I. **PROPOSAL**. Write a brief abstract, not exceeding 100 words, which describes the overall content of the proposal.

This proposal seeks to adjust the math program for the Mathematics Teaching Specialization, Grades 5-9.

The change is to remove Math 2216 - Discrete Math from the list of required courses for the teaching specialization.

There are also numerical and description errors in the catalog for the Mathematics Teaching Specialization, Grades 5-9, that will be corrected.

II. **DESCRIPTION OF THE PROPOSAL**. Provide a response for each letter, A-H, and for each Roman Numeral II–V. If any section does not apply to your proposal, reply N/A.

A. Deletion of course(s) or credit(s) from program(s)

MATH 2216 – Discrete Math

Total hours deleted. **3**

B. Addition of course(s) or credit(s) from program(s)

NA

Total hours added. _____

C. Provision for interchangeable use of course(s) with program(s)

The Mathematics Teaching Specialization, Grades 5-9 can be added as an endorsement to any other teaching specialization. It can be added to an Elementary K-6 or to any Secondary 5-Adult degree. The required number of hours will be different because the Elementary K-6 degree includes some of the required 5-9 math specialization courses in that program, while some of the 5-Adult programs do not include them.

D. Revision of course content. Include, as an appendix, a revised course description, written in complete sentences, suitable for use in the university catalog.

NA

E. Other changes to existing courses such as changes to title, course number, and elective or required status.

NA

F. Creation of new course(s). For each new course

NA

1. Designate the course number, title, units of credit, prerequisites (if any), ownership (FSU or shared) and specify its status as an elective or required course. If you are creating a shared course, attach a memo from the Deans of the affected Schools explaining the rationale for the course being shared.

2. Include, as an appendix, a course description, written in complete sentences, suitable for use in the college catalog.

3. Include, as an appendix, a detailed course outline consisting of at least two levels.

4. In order to meet the requirements as outlined in Goal One of the Strategic Plan, please include Outcome Competencies and Methods of Assessment as an appendix. Examples are available upon request from the Chair of the Curriculum Committee.

G. Attach an itemized summary of the present program(s) affected, if any, and of the proposed change(s).

Describe how this proposal affects the hours needed to complete this program. Specifically, what is the net gain or loss in hours?

See Current and Proposed Programs in Appendix A.

III. **RATIONALE FOR THE PROPOSAL.**

A. **Quantitative Assessment**: Indicate the types of assessment data, i.e., surveys, interviews, capstone courses, projects, licensure exams, nationally-normed tests, locally developed measurements, accreditation reports, etc., that were collected and analyzed to determine that curricular changes were warranted. Quantitative data is preferred.

National certification for the math education programs have changed from NCATE to NCTM CAEP. Due to this change there are different standards which must be met for certification of Middle School Mathematics Certification (Grades 5-9). In the new standards, Discrete Mathematics is no longer a separate standard, but incorporated within others. The amount of Discrete Mathematics necessary for Middle School certification can now be handled within other courses. See Appendix B.

Students who earn the Mathematics Teaching Specialization, Grades 5-9, may attach it to an elementary education teaching degree or to any other teaching specialization although the FSU catalog does not indicate this.

B. **Qualitative Assessment**: Based upon the assessment data above, indicate why a curricular change is justified. Indicate the expected results of the change. Be sure to include an estimate of the increased cost, or reduction in cost of implementation. FOR EXAMPLE: Will new faculty, facilities, equipment, or library materials be required?

In the past, middle school math specialization pre-service teachers would take MATH 2216 – Discrete with math majors, Math Education 5-Adult, and Computer Science majors. This group had very diverse needs. Hence, by removing the middle school pre-service math teachers, the math department will be better able to serve the needs of Computer Science and Mathematics. There are also adjustments to the structure and content in Math 2216 – Discrete Mathematics under discussion.

By dropping MATH 2216 - Discrete from the Middle School Mathematics Certification (Grades 5-9), it will reduce the number of hours by 3.

This will not require any additional funds.

IV. Should this proposal affect any course or program in another school, a memo must be sent to the Dean of each school impacted and a copy of the memo(s) must be included with this proposal. In addition, the Deans of the affected schools must sign below to indicate their notification of this proposal.

By signing here, you are indicating your college's/school's notification of this proposal.

College/School	Dean	Signature
Education	**Dr. Carolyn Crislip-Tacy**	**See attached at back of proposal**
College of Science & Technology	**Dr. Don Trisel**	

V. hould this proposal affect any course to be added or deleted from the general studies requirements, a memo from the chair of the General Studies Committee indicating approval of the change must be included with this proposal.

VI. ADDITIONAL COMMENTS.

APPENDIX A

Mathematics Teaching Specialization, Grades 5-9

Current Program

Required Major Courses		HRS	
MATH 1112	COLLEGE ALGEBRA*	3	
MATH 1113	APPLIED STATISTICS	3	
MATH 1115	TRIG. AND ELEMENTARY FUNCTIONS	3	
MATH 1125	MATH REASONING: READING AND WRITING	3	
MATH 1185	APPLIED CALCULUS I	4	
MATH 2216	INTRODUCTION TO DISCRETE MATHEMATICS	3	
MATH 2251	STRUCTURE OF THE REAL NUMBERS	3	
MATH 2252	DATA ANALYSIS AND GEOMETRY	3	
MATH 3353	MATH METHODS FOR ELEMENTARY TEACHERS	3	
MATH 4431	METHODS & MATERIALS IN TEACHING MATH	3	
	* omit if Math ACT greater than or equal to 23		
TOTAL Required Specialization Courses			31
FSU College Catalog page 76 - states 29 semester hours.			
Major Electives		XX	
Minor Requirements/Electives (if minor is required)			XX
TOTAL HOURS FOR Teaching Specialization			**31**

Required General Studies Courses Does NOT affect. Since this in an add-on certification, the original degree program will encompass all general studies requirements.
Attribute IA – Critical Analysis
Attribute IB – Quantitative Literacy
Attribute IC – Written Communication
Attribute ID - Teamwork
Attribute IE – Information Literacy
Attribute IF – Technology Literacy
Attribute IG – Oral Communication
Attribute III - Citizenship
Attribute IV - Ethics
Attribute V - Health
Attribute VI - Interdisciplinary
Attribute VIIA - Arts
Attribute VIIB - Humanities
Attribute VIIC – Social Sciences
Attribute VIID - Natural Science
Attribute VIII – Cultural Awareness
Additional General Studies hours
TOTAL GENERAL STUDIES HOURS
TOTAL FREE ELECTIVES
TOTAL HOURS

APPENDIX A

Mathematics Teaching Specialization, Grades 5-9

Proposed Program

Required Major Courses		HRS	
MATH 1112	COLLEGE ALGEBRA*	3	
MATH 1113	APPLIED STATISTICS	3	
MATH 1115	TRIG. AND ELEMENTARY FUNCTIONS	3	
MATH 1125	MATH REASONING: READING AND WRITING	3	
MATH 1185	APPLIED CALCULUS I	4	
MATH 2251	STRUCTURE OF THE REAL NUMBERS	3	
MATH 2252	DATA ANALYSIS AND GEOMETRY	3	
MATH 3353	MATH METHODS FOR ELEMENTARY TEACHERS	3	
MATH 4431	METHODS & MATERIALS IN TEACHING MATH	3	
	* omit if Math ACT greater than or equal to 23		
	TOTAL Required Specialization Courses	28	
If specialization is attached to a K-6 Elementary Education degree, then additional required hours are only		16	
Major Electives			XX
Minor Requirements/Electives (if minor is required)			XX
TOTAL HOURS FOR Teaching Specialization			**28**

Required General Studies Courses Does NOT affect. Since this in an add-on certification, the original degree program will encompass all general studies requirements.
Attribute IA – Critical Analysis
Attribute IB – Quantitative Literacy
Attribute IC – Written Communication
Attribute ID - Teamwork
Attribute IE – Information Literacy
Attribute IF – Technology Literacy
Attribute IG – Oral Communication
Attribute III - Citizenship
Attribute IV - Ethics
Attribute V - Health
Attribute VI - Interdisciplinary
Attribute VIIA - Arts
Attribute VIIB - Humanities
Attribute VIIC – Social Sciences
Attribute VIID - Natural Science
Attribute VIII – Cultural Awareness
Additional General Studies hours
TOTAL GENERAL STUDIES HOURS
TOTAL FREE ELECTIVES
TOTAL HOURS

Appendix B

NCTM CAEP Standards (2012) – Middle Grades (Initial Preparation)

Standard 1: Content Knowledge

Effective teachers of middle grades mathematics demonstrate and apply knowledge of major mathematics concepts, algorithms, procedures, connections, and applications within and among mathematical content domains. Preservice teacher candidates:

1a) Demonstrate and apply knowledge of major mathematics concepts, algorithms, procedures, applications in varied contexts, and connections within and among mathematical domains (Number, Algebra, Geometry, Trigonometry, Statistics, Probability, and Calculus) as outlined in the *NCTM CAEP Mathematics Content for Middle Grades*.

NCTM CAEP Mathematics Content for Middle Grades-- Addendum to the NCTM CAEP Standards 2012

B. Middle Grades Mathematics Teachers

All middle grades mathematics teachers should be prepared with depth and breadth in the following mathematical domains: Number, Algebra, Geometry, Trigonometry, Statistics, Probability, and Calculus. All teachers certified in middle grades mathematics should know, understand, teach, and be able to communicate their mathematical knowledge with the breadth of understanding reflecting the following competencies for each of these domains.

B.1. Number Systems

To be prepared to develop student mathematical proficiency, all middle grades mathematics teachers should know the following topics related to number systems with their content understanding and mathematical practices supported by appropriate technology and varied representational tools, including concrete models:

B.1.1 Structure, properties, relationships, operations, and representations, including standard and non-standard algorithms, of numbers and number systems including whole, integer, rational, irrational, real, and complex numbers

B.1.2 Fundamental ideas of number theory (divisors, factors and factorization, primes, composite numbers, greatest common factor, and least common multiple)

B.1.3 Quantitative reasoning and relationships that include ratio, rate, and proportion and the use of units in problem situations

B.1.4 Vector and matrix operations, modeling, and applications

B.1.5 Historical development and perspectives of number, number systems, and quantity including contributions of significant figures and diverse cultures

B.2. Algebra

To be prepared to develop student mathematical proficiency, all middle grades mathematics teachers should know the following topics related to algebra with their content understanding and mathematical practices supported by appropriate technology and varied representational tools, including concrete models:

B.2.1 Algebraic notation, symbols, expressions, equations, inequalities, and proportional relationships, and their use in describing, interpreting, modeling, generalizing, and justifying relationships and operations

B.2.2 Function classes including polynomial, exponential and logarithmic, absolute value, rational, and trigonometric, including those with discrete domains (e.g., sequences), and how the choices of parameters determine particular cases and model specific situations 2

B.2.3 Functional representations (tables, graphs, equations, descriptions, recursive definitions, and finite differences), characteristics (e.g., zeros, intervals of increase or decrease, extrema, average rates of change, domain and range, and end behavior), and notations as a means to describe, reason, interpret, and analyze relationships and to build new functions

B.2.4 Patterns of change in linear, quadratic, polynomial, and exponential functions and in proportional and inversely proportional relationships and types of real-world relationships these functions can model

B.2.5 Historical development and perspectives of algebra including contributions of significant figures and diverse cultures

B.3. Geometry and Trigonometry

To be prepared to develop student mathematical proficiency, all middle grades mathematics teachers should know the following topics related to geometry and trigonometry with their content understanding and mathematical practices supported by appropriate technology and varied representational tools, including concrete models:

B.3.1 Core concepts and principles of Euclidean geometry in two and three dimensions and two-dimensional non-Euclidean geometries

B.3.2 Transformations including dilations, translations, rotations, reflections, glide reflections; compositions of transformations; and the expression of symmetry in terms of transformations

B.3.3 Congruence, similarity and scaling, and their development and expression in terms of transformations

B.3.4 Right triangles and trigonometry

B.3.5 Application of periodic phenomena and trigonometric identities

B.3.6 Identification, classification into categories, visualization, and representation of two- and three-dimensional objects (triangles, quadrilaterals, regular polygons, prisms, pyramids, cones, cylinders, and spheres)

B.3.7 Formula rationale and derivation (perimeter, area, surface area, and volume) of two- and three-dimensional objects (triangles, quadrilaterals, regular polygons, rectangular prisms, pyramids, cones, cylinders, and spheres), with attention to units, unit comparison, and the iteration, additivity, and invariance related to measurements

B.3.8 Geometric constructions, axiomatic reasoning, and proof

B.3.9 Analytic and coordinate geometry including algebraic proofs (e.g., the Pythagorean Theorem and its converse) and equations of lines and planes

NCTM CAEP Mathematics Content for Middle Grades (2012)

B.3.10 Historical development and perspectives of geometry and trigonometry including contributions of significant figures and diverse cultures

B.4. Statistics and Probability

To be prepared to develop student mathematical proficiency, all middle grades mathematics teachers should know the following topics related to statistics and probability with their content understanding and mathematical practices supported by appropriate technology and varied representational tools, including concrete models:

B.4.1 Statistical variability and its sources and the role of randomness in statistical inference

B.4.2 Creation and implementation of surveys and investigations using sampling methods and statistical designs, statistical inference (estimation of population parameters and hypotheses testing), justification of conclusions, and generalization of results

B.4.3 Univariate and bivariate data distributions for categorical data and for discrete and continuous random variables, including representations, construction and interpretation of graphical displays (e.g., box plots, histograms, cumulative frequency plots, scatter plots), summary measures, and comparisons of distributions

B.4.4 Empirical and theoretical probability (discrete, continuous, and conditional) for both simple and compound events

B.4.5 Random (chance) phenomena, simulations, and probability distributions and their application as models of real phenomena and to decision making

B.4.6 Historical development and perspectives of statistics and probability including contributions of significant figures and diverse cultures

B.5. Calculus

To be prepared to develop student mathematical proficiency, all middle grades mathematics teachers should know the following topics related to calculus with their content understanding and mathematical practices supported by appropriate technology and varied representational tools, including concrete models:

B.5.1 Limits, continuity, rates of change, the Fundamental Theorem of Calculus, and the meanings and techniques of differentiation and integration

B.5.2 Applications of function, geometry, and trigonometry concepts to solve problems involving calculus

B.5.3 Historical development and perspectives of calculus including contributions of significant figures and diverse cultures

Standard 2: Mathematical Practices

Effective teachers of middle grades mathematics solve problems, represent mathematical ideas, reason, prove, use mathematical models, attend to precision, identify elements of structure, generalize, engage in mathematical communication, and make connections as essential mathematical practices. They understand that these practices intersect with mathematical content and that understanding relies on the ability to demonstrate these practices within and among mathematical domains and in their teaching.

Preservice teacher candidates:

2a) Use problem solving to develop conceptual understanding, make sense of a wide variety of problems and persevere in solving them, apply and adapt a variety of strategies in solving problems confronted within the field of mathematics and other contexts, and formulate and test conjectures in order to frame generalizations.

2b) Reason abstractly, reflectively, and quantitatively with attention to units, constructing viable arguments and proofs, and critiquing the reasoning of others; represent and model generalizations using mathematics; recognize structure and express regularity in patterns of mathematical reasoning; use multiple representations to model and describe mathematics; and utilize appropriate mathematical vocabulary and symbols to communicate mathematical ideas to others.

2c) Formulate, represent, analyze, and interpret mathematical models derived from real-world contexts or mathematical problems.

2d) Organize mathematical thinking and use the language of mathematics to express ideas precisely, both orally and in writing to multiple audiences.

2e) Demonstrate the interconnectedness of mathematical ideas and how they build on one another and recognize and apply mathematical connections among mathematical ideas and across various content areas and real-world contexts.

2f) Model how the development of mathematical understanding within and among mathematical domains intersects with the mathematical practices of problem solving, reasoning, communicating, connecting, and representing.