BOARD OF REGENTS

SUMMARY OF ITEM FOR ACTION, INFORMATION OR DISCUSSION

TOPIC: University of Maryland, College Park: Bachelor of Science in Middle School Education with Concentrations in Mathematics and Science

COMMITTEE: Education Policy

DATE OF COMMITTEE MEETING: January 26, 2011

SUMMARY: The proposed Bachelor of Science in Middle School Education is responsive to the State's identified need for preparation of Middle School teachers and the USM focus on STEM areas. The proposed new degree is designed to provide students with a balanced program of mathematics and science content accompanied by pedagogical preparation designed specifically to address teaching and learning in middle school.

Currently, both the mathematics and science education programs do prepare candidates who wish to teach middle school, but this is done within the confines of the existing secondary education programs. As a result, candidates must complete an entire major in either mathematics or science, which leaves little opportunity to obtain adequate content preparation to teach two subjects in middle school – one of the National Middle School Association standards. In addition, secondary programs only prepare teachers for Grades 7-12, while this program would prepare teachers for the middle grades specified by the Maryland State Department of Education (MSDE): Grades 4-9. For the lower grades, the demands of the existing elementary education program make it difficult for candidates to receive adequate content preparation in particular subject areas.

The proposed program would prepare reflective practitioners, skilled in inquiry, with the knowledge of content, pedagogy and student learning necessary for teaching middle school mathematics and science in alignment with the National Middle School Association (NMSA), National Council for Teachers of Mathematics (NCTM), National Science Teachers Association (NSTA) standards, and the College of Education Conceptual Framework. The subject matter courses in mathematics and science are closely aligned with the State of Maryland Middle School Voluntary State Curriculum, which is based on professional association (e.g., NSTA and NCTM) content standards.

The University has identified interest in this option through a survey administered to senior education majors in Fall 2009, where approximately 15-20% of the elementary education majors indicated that they might have considered a middle school science/math education option had it been available. It is expected that, at least initially, students will not be new to the university, and therefore a curriculum and budget has been constructed that assumes no new tuition resources. Within the College of Education, resources will be reallocated to support the education portions of the curriculum, based on projected shifts of students among these majors. Under the assumption that each cohort will be about 25 students, 11 EDCI course sections (40 credits) currently provided for Elementary Education majors will be discontinued and replaced with 12 sections (38 credits) in the new curriculum. Somewhat smaller shifts will be required in the Departments of Human Development (EDHD) and Policy Studies (EDPS).

ALTERNATIVE(S): The Regents may not approve the program or may request further information.

FISCAL IMPACT: No additional funding is necessary. The program will be supported through tuition and reallocation of resources within the College of Education.

CHANCELLOR'S RECOMMENDATION: That the Committee on Education Policy recommend that the Board of Regents approve the proposal from the University of Maryland, College Park to offer the Bachelor of Science in Middle School Education with Concentrations in Mathematics and Science

COMMITTEE RECOMMENDATION: DATE:

BOARD ACTION: DATE:

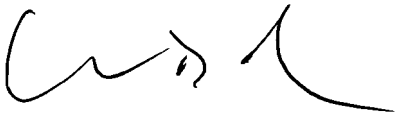
SUBMITTED BY: Irwin Goldstein (301) 445-1992 irv@usmd.edu

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

X New Instructional Program
_____ Substantial Expansion/Major Modification
_____ Cooperative Degree Program

University of Maryland, College Park
Institution Submitting Proposal

Middle School Education
Title of Proposed Program

Bachelor of Science	**Fall 2012**
Degree to be Awarded	Projected Implementation Date
	13.1203: Middle School Education
Proposed HEGIS Code	Proposed CIP Code
Curriculum and Development (EDCI)	**Linda Valli**
Department in which program will be located	Department Contact
301-405-3117	**lrv@umd.edu**
Contact Phone Number	Contact E-Mail Address
	**December 7, 2010**
Signature of President or Designee	Date

I. Mission

A key aspect of the University of Maryland's mission is to engage in collaborative partnerships to develop programs that fill demonstrated needs for the State of Maryland and that are consistent with the objectives of our existing academic programs. Preparation of middle school teachers has been identified by State Superintendent of Schools Nancy S. Grasmick as a major need in Maryland public schools. Increased attention has also turned to Science, Technology, Engineering and Math (STEM) education initiatives at the national, state, and local levels, and the University of Maryland System has identified STEM education as a high priority. The University of Maryland is committed to providing increased opportunities for teacher certification, either through a B.A. or B.S. degree, or as part of a Master's Certification. Last year, we developed a Middle School Math/Science specialty within our M.Ed. with Certification in Curriculum and Instruction to begin this process. This proposal addresses the former option, through a B.S. in Middle School Education with concentrations in Mathematics and Science.

II. Characteristics of the Proposed Program

A. Educational Objectives of the Program

The proposed new degree would provide a balanced program of mathematics and science content accompanied by pedagogical preparation designed specifically to address teaching and learning in middle school. Currently, both the mathematics and science education programs do prepare candidates who wish to teach middle school, but this is done within the confines of the existing secondary education programs. As a result, candidates must complete an entire major in either mathematics or science, which leaves little opportunity to get adequate content preparation to teach two subjects in middle school – one of the National Middle School Association standards. In addition, secondary programs only prepare teachers for Grades 7-12, while this program would prepare teachers for the middle grades specified by the Maryland State Department of Education (MSDE): Grades 4-9. For the lower grades, the demands of the existing elementary education program make it difficult for candidates to receive adequate content preparation in particular subject areas.

In the future, the Department of Curriculum and Instruction (EDCI) may develop additional plans for middle school certification in mathematics or science and one of the two other areas that the state recognizes for middle school licensure—English language arts and social studies. EDCI foresees, however, that one of the areas will always be in STEM. Here we propose only the mathematics and science combination.

The program we propose builds upon the best of professional standards, model programs at the University of Georgia, Ohio State University, and the University of North Carolina, and our own long history of innovative, research-based teacher preparation. The coursework in our program explicitly requires middle school teacher candidates to integrate curriculum across traditional disciplinary boundaries by using innovative technologies and working collaboratively with fellow teachers. In addition, we draw on the expertise and findings from research grants of our own faculty to help prospective teachers find ways of accessing and assessing student thinking in order to promote cognitive growth and equitable classroom environments, especially for English language learners and special needs students.

B. Description of program as it would appear in the catalog

The Middle School Education Program (Mathematics and Science Concentration) is designed to prepare candidates to earn a Bachelor of Science degree and to meet the MSDE requirements for certification in grades

4-9, with a specific focus on mathematics and science teaching. The program prepares reflective practitioners, skilled in inquiry, with the knowledge of content, pedagogy and student learning necessary for teaching middle school mathematics and science in alignment with the National Middle School Association (NMSA), National Council for Teachers of Mathematics (NCTM), National Science Teachers Association (NSTA) standards, and the College of Education Conceptual Framework. The subject matter courses in mathematics and science are closely aligned with the State of Maryland Middle School Voluntary State Curriculum, which is based on professional association (e.g., NSTA and NCTM) content standards.

C. General requirements for degree

The B.S. in Middle School Education with the Science/Mathematics concentration requires a basic foundation in mathematics and a broad exposure to science, consistent with the expected content for middle school learners. The curriculum draws from existing introductory science courses in the College of Computer, Mathematical, and Natural Sciences (CMNS) and in Anthropology, Environmental Science and Plant Sciences, and from a suite of specialized courses in Mathematics for education majors.

In science education, the content NSTA standards call for middle grades teachers to have background in chemical, and physical, life, and earth/space sciences. This program requires students to have courses in each of those areas. In mathematics education, the content standards for teachers call for knowledge in mathematical problem solving, reasoning and proof, mathematical connections, mathematical representation, number and operation, algebra and geometry, data analysis, statistics and probability, and measurement. The six courses required in this program focus on these topics. The remaining two knowledge areas that NCTM lists for middle school teachers—calculus and discrete mathematics—are treated implicitly and at a level appropriate for middle-grade teachers. For example, several of the courses, but especially Math 315, deal with the conceptual ideas behind calculus: how quantities change, and their rates of change. Similarly, the fundamental ideas of discrete mathematics (i.e., combinatorics, recursion, and finite graphs) are distributed across and contained within the other content standards that the courses address.

D. Total number of credits and their distribution

The program includes 41-42 credits (12 courses) in the mathematics and science subject area, and 47 credits in pre-professional and professional education, for a total of 88-89 credits. Additional General Education requirements bring the total number of credits for the B.S. degree to 120. Appendix A includes a plan indicating how this program might be completed in four years.

D. List of courses by title and number

Course descriptions are included as Appendix B. Alignment between the course content and the Maryland Voluntary State Curriculum are indicated in Appendix C.

Pre-Professional/Subject Area Courses	Credits
GEOL 100/110 Physical Geology and Laboratory	4
PHYS 115 Inquiry into Physics or PHYS 121 Fundamentals of Physics I	4
BSCI 103 The World of Biology or BSCI 105 Principles of Biology I or BSCI 122 Microbes in Society	4
CHEM 131/132 Fundamentals of General Chemistry and Laboratory	4

AOSC 200/201 Weather and Climate with Laboratory	4
MATH 212 Elements of Numbers and Operations	3
MATH 213 Elements of Geometry and Measurement	3
MATH 214 Elements of Probability and Statistics	3
*MATH 312 Mathematical Reasoning and Proof for Pre-service Middle School Teachers (new course)	3
*MATH 314 Introduction to Probability, Data Analysis, and Statistics for Pre-Service Middle School Teachers (new course)	3
*MATH 315 Algebra for Pre-Service Middle School Teacher (new course)	3
One from:	**3-4**
ANTH 220 Introduction to Biological Anthropology	
ASTR 100/111 Introduction to Astronomy and Observational Astronomy Laboratory *or* ASTR 101 General Astronomy	
ASTR 121 Introductory Astrophysics II – Stars and Beyond	
BSCI I06 Principles of Biology II	
BSCI 120 Insects	
BSCI 124/125 Plant Biology and Laboratory for Non-Science Students	
CHEM 104 Fundamentals of Organic and Biochemistry	
ENST 200 Fundamentals of Soil Science	
GEOG 201/211 Geography of Environmental Systems and Laboratory	
PHYS 102/103 Physics of Music and Laboratory	
PHYS 106/107 Light, Perception, Photography, and Visual Phenomena and Laboratory	
PLSC 100 Introduction to Horticulture	
PLSC 101 Introductory Crop Science	
Subtotal	**41-42**

Pre-Professional Education Courses

EDPS 210 Historical and Philosophical Perspectives on Education *or* EDPS 301 Foundations of Education	3
EDCI 280 Introduction to Teaching**	3
EDCI 297 Schooling, Students, Families, and Communities (new course, approved)	3
EDHD 4XX Adolescent Development (a middle school version of EDHD 413)	3
*EDHD 436 Cognition and Motivation in Reading: Reading Acquisition for Middle School Students (new course being proposed)	3
*EDCI 465 Teaching Reading in Middle School Content Areas (new course Proposed)	3
Subtotal	**18**

Professional Education Courses

*EDCI 360 Field Experience in Middle School Education (new course, proposed)	1
EDCI 411 Knowledge, Reasoning, and Learning in Science	3
EDCI 413 Interdisciplinary Middle School Teaching Methods (new course, approved)	2
EDCI 414 Interdisciplinary Middle School Teaching Methods II (new course, approved)	2
EDCI 424 Equitable Classrooms (new course, approved)	2

EDCI 425 Equity and Pedagogy (new course, approved)	2
EDCI 457 Teaching and Learning Middle School Mathematics	3
*EDCI 460 Student Teaching: Middle School (course title change)	12
EDCI 474 Inclusion, Diversity, and Professionalism in Secondary Teaching	2
Subtotal	**29**
Total	**88-89**

F. Description of thesis and/or non-thesis option for graduate programs

Not Applicable

G. Expected student learning outcomes

The program's learning outcomes are driven by the National Middle School Association (NMSA) standards, and aligned with the College of Education Conceptual Framework. Appendix D summarizes the program's learning outcomes and where and how the outcomes are assessed.

H. Demonstrable quality of program faculty

Oversight and responsibility for this program will be with faculty members in the College of Education, Department of Curriculum and Instruction's (EDCI) Center for Mathematics Education and Science Teaching Center. Dr. Daniel Chazan, Associate Professor in mathematics education (Ed. D. Harvard University) and Dr. Janet Coffey, Assistant Professor in science education (Ph.D. Stanford University) will serve as the primary points of contact. Dr. Richard Hollenbeck, (Ph.D. University of Maryland in mathematics education) will serve as the coordinator. Other faculty with relevant background in the education of early adolescents (e.g., Maria Hyler, Ph.D. Stanford) will be involved in delivering the professional education courses. EDCI faculty will be advised by representatives from the Mathematics Department and science departments, such as Dr. Brian Hunt, Professor and Undergraduate Chair of Mathematics, Ph. D. Stanford University; Dr. Spencer Benson, Associate Professor, Ph.D. University of Chicago; and Dr. Joelle Presson, Assistant Dean, Ph.D. University of Oregon. Formal staffing assignments will be made by the respective Department Chairs based upon recommendations from Drs. Chazan and Coffey.

The program will be administered from the College of Education's Department of Curriculum and Instruction. The directors of the EDCI Center for Mathematics Education and the Science Teaching Center will be responsible for the academic direction and oversight. A clinical faculty member in the mathematics education unit will be primarily responsible for day-to-day administration of the program, with support from the Director of Undergraduate Advising, and Chair of EDCI. The Teacher Preparation Leadership committee has the responsibility for oversight of all teacher education programs in the department. We anticipate being able to staff the new courses with existing tenure-line and full-time clinical faculty.

I. Student audience to be served by program and enrollment estimates

The program is expected to attract 20-30 students per year, drawing from current elementary education candidates who are interested in teaching middle school mathematics and science and prospective secondary science and mathematics education candidates who do not want to commit to a full content major in either subject. Additionally, the program will attract students from other pre-professional tracks (e.g., pre-med

students or engineering students) who have decided to leave those tracks and are interested in teaching. We have identified interest in this option through a survey administered to senior education majors in Fall 2009, where approximately 15-20% of the elementary education majors indicated that they might have considered a middle school science/math education option had it been available. It is our expectation that, at least initially, students will not be new to the university, and we have therefore constructed a curriculum and budget that assumes no new tuition resources. Within the College of Education, resources will be reallocated to support the education portions of the curriculum, based on projected shifts of students among these majors. Under the assumption that each cohort will be about 25 students, 11 EDCI course sections (40 credits) currently provided for Elementary Education majors will be discontinued and replaced with 12 sections (38 credits) in the new curriculum. Somewhat smaller shifts will be required in the Departments of Human Development (EDHD) and Policy Studies (EDPS).

J. Impact on student's technology fluency

All teacher preparation programs at the University of Maryland are designed to meet the seven "Maryland State Department of Education Technology Standards. " These standards require, for example, that all of our teacher candidates are able to integrate technology into their curriculum and instruction, use assistive technology to enhance student learning, evaluate technology materials and media to determine appropriate instructional use, and understand the legal, social and ethical issues related to technology use. These standards guide course curriculum and student assessment, including (a) the quarterly performance-based assessments (PBAs) used during the students' internship year and (b) students' culminating professional portfolios. As part of their professional coursework, for example, students in the middle school program would be required to develop lessons that use technology to build understanding of important mathematical and scientific concepts. During their internship, they would demonstrate proficiency of technology use in their instructional delivery. These lessons would be assessed in their PBAs; students would reflect upon their work and evaluate their technology fluency in their portfolio submissions.

In addition, the mathematics and science courses that the middle school majors will take typically incorporate technology as part of the instruction. In their science and mathematics classes, technology is often integral to students' coursework, used to support conceptual understanding and solve problems. For example, in many of the science courses, computer simulations are used to illustrate or model complex processes, such as plate tectonics, energy transformation, chemical reaction rates and kinematics. Probes are used for data collection and measurement in laboratory settings, and data analysis software is introduced to help with large data sets. Graphing calculators are frequently used in mathematics coursework. In Math 312, as one specific example, a number of virtual interactive manipulatives are used to foster student understanding of rational numbers. Experiencing technology in their own coursework can help teacher candidates better integrate technology in their future classrooms with students.

K. Library requirements

The President assures that institutional library resources meet new program needs. Because this program draws on resources currently used in the elementary and secondary programs, there are sufficient curriculum and library resources available.

L. Facilities and equipment

The President assures that institutional facilities meet new program needs. Existing physical resources are adequate to support the proposed program. The small size of the program relative to the size of existing programs administered by EDCI means that the program will have minimal impact on the use of existing facilities and equipment.

III. Resources and Expenditures

TABLE 1: RESOURCES					
Resources Categories	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
1.Reallocated Funds[1]	$38,750	$107,250	$172,250	$172,250	$172,250
2. Tuition/Fee Revenue[2] (c+g below)					
a. # F.T. Students[1]	25	50	75	75	75
b. Annual Tuition/Fee					
c. Annual Full Time Revenue (a x b)					
d. # Part Time Students	0	0	0	0	0
e. Credit Hour Rate	0	0	0	0	0
f. Annual Credit Hours	0	0	0	0	0
g. Total Part Time Revenue (d x e x f)	0	0	0	0	0
3. Grants, Contracts, & Other External Sources			0	0	0
4. Other Sources	0	0	0	0	0
TOTAL (Add 1 - 4)	$38,750	$107,250	$172,250	$172,250	$172,250

[1] Based on discontinuation of an Elementary Education cohort of 25 students; 20 in-state, 5 out of state

TABLE 2: EXPENDITURES					
Expenditure Categories	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
1. Total Faculty Expenses (b + c below)	$39,000	$97,500	$133,250	$133,250	$133,250
a. # FTE					
b. Total Salary```````	$30,000	$75,000	$102,500	$102,500	$102,500
c. Total Benefits[2]	$9,000	$22,500	$30,750	$30,750	$30,750
2. Total Administrative Staff Expenses (b + c below)		$13,520	$22,490	$22,490	$22,490
a. # FTE		0.20	0.33	0.33	0.33
b. Total Salary		$10,400	$17,300	$17,300	$17,300
c. Total Benefits		$3,120	$5,190	$5,190	$5,190
3. Total Support Staff Expenses (b + c below)	0	0	0	0	0
a. # FTE	0	0	0	0	0
b. Total Salary	0	0	0	0	0
c. Total Benefits	0	0	0	0	0
4. Equipment	0	0	0	0	0
5. Library	0	0	0	0	0
6. New or Renovated Space				0	
7. Other Expenses			$15,000	$15,000	$15,000
TOTAL (Add 1 - 7)	$39,000	$111,020	$170,740	$170,740	$170,740

[2] Benefits calculated as 0.3 x salary

Appendix A: Middle School Academic Plan-(Math/Science)

FRESHMAN:

Fall Semester:	***Cr.***	***Spring Semester:***	***Cr.***
ENGL 101 (FE)	3	***Content A (Geol 100/110)***	4
Freshman Math	3	CORE –Lab	3
Core –SB	3	***Other Content 1 (Math 212)***	3
Core –SH	3	Core –HL	3
UNIV 101	2		
Total Credits	**14**	*Total Credits*	**13**

SOPHOMORE: ***Apply to Professional Program between 45 and 60 credits***

Fall Semester:	***Cr.***	***Spring Semester:***	***Cr.***
Content B (Phys 115)	4	**EDCI 297**	3
Other Content 2 (Math 213)	3	***Other Content 3 (Math 214)***	3
EDCI 280 (as rev. 2009)	3	***Content C (BSCI option)***	4
EDPS 310 or 210	3	CORE Diversity (D) +HA	3
Possible Elective/Core	3	Possible Elective/Core	3
Total Credits	**16**	*Total Credits*	**16**

JUNIOR YEAR:

Fall Semester:	***Cr.***	***Spring Semester:***	***Cr.***
EDHD 436 (proposed)	3	***Content E (AOSC 200/201)***	4
Content D (Chem 131/132)	4	ENGL 39_ Advanced Composition	3
Other Content 4 (Math 312)	3	***Other Content 5 (Math 314)***	3
EDHD 4XX (M.S. equivalent of EDHD 413)	3	**EDCI 465 (proposed)**	3
Content Methods (EDCI 411 or 457)	3	**Content Methods (EDCI 411 or 457)**	3
Total Credits	**16**	*Total Credits*	**16**

SENIOR YEAR

Fall Semester:	***Cr.***	***Spring Semester:***	***Cr.***
Other Content 6 (Math 315)	3	**EDCI 460 Student Teaching**	12
Content F (Sci Elective)	3	**EDCI 414**	2
EDCI 413	2	**EDCI 426**	2
EDCI 425	2		
EDCI 360 (Field Experience)	1		
EDCI 474	2		
Total Credits	**13**	*Total Credits*	**16**

* Two content area classes must be Upper Level 3xx-4xx for Advanced Studies

Total Credits: 120

Field Placements:

Freshman Year- UNIV 101 with America Counts
Sophomore Year- EDCI 280
Junior Year- Methods
Senior Year-Field Practicum, Internship

Appendix B: Middle School Education Program Required Course Descriptions

B.I Pre-Professional/Subject Area Courses

GEOL 100/110 Physical Geology and Laboratory (4)
GEOL 100: A general survey of the rocks and minerals composing the earth, its surface features and the agents that form them, and the dynamic forces of plate tectonics. GEOL 110: The basic materials and tools of physical geology stressing familiarization with rocks and minerals and the use of maps in geologic interpretations.

PHYS 115 Inquiry into Physics (4)
Intended for students majoring in neither the physical nor the biological sciences. Use of laboratory-based and inquiry-based methods to study some of the basic ideas of physical sciences.
-or-
PHYS 121 Fundamentals of Physics I (4)
The first part of a two-semester course in general physics treating the fields of mechanics, heat, sound, electricity, magnetism, optics, and modern physics. Together with PHYS122, this generally satisfies the minimum requirement of medical and dental schools.

BSCI 103 The World of Biology (4)
An introduction to modern biology for the non-science major. Major themes include molecular biology, cell biology, evolution and organismal biology. Relevance of study of biology to modern human life will be emphasized. Course not acceptable toward degree in College of Chemical and Life Sciences.
-or-
BSCI 105 Principles of Biology I (4)
Basic principles of biology with special emphasis on cellular and molecular biology.
-or-
BSCI 122 Microbes and Society (4)
Introduction to the historical, societal and conceptual aspects of microbiology and biotechnology. Course not acceptable toward major requirements in the College of Chemistry and Life Sciences.

CHEM 131/132 Chemistry I – Fundamentals of General Chemistry and Laboratory (4)
CHEM 131: An overview of the Periodic Table, inorganic substances, ionic and covalent bonding, bulk properties of materials, chemical equilibrium, and quantitative chemistry. CHEM131 is the first course in a four-semester sequence for students majoring in the sciences, other than Chemistry and Biochemistry majors. CHEM 132: Introduction to the quanitification of chemical substances, including the concept of the mole and chemical stoichiometry. Additional work involves the synthesis of ionic substances and their qualitative characterization. Must be taken concurrently with CHEM131.

AOSC 200/201 Weather and Climate and Laboratory (4)
AOSC 200: Broad survey of the state of knowledge and problems of atmospheric science. Origin and structure of the atmosphere, meteorological observations, weather maps, forecasting, satellites, energetics, wind general circulation, storms, severe weather, climate change, air pollution. AOSC 201: Laboratory exercises to supplement AOSC200, including weather observations, weather map analysis, use of the Internet, forecasting practice and climate modeling.

MATH 212 Elements of Numbers and Operations (3)
Topics from algebra and number theory designed to provide insight into arithmetic: sets, functions, number systems, number theory; operations with natural numbers, integers, rational numbers; linear equations.

MATH 213 Elements of Geometry and Measurement (3)
Properties of geometric objects in two and three dimensions; parallel lines, curves and polygons; ratio, proportion, similarity; transformational geometry and measurement, constructions, justifications and proofs.

MATH 214 Elements of Probability and Statistics (3)
Permutations and combinations; probability; collecting and representing data; using statistics to analyze and interpret data.

MATH 312 Math Reasoning and Proof (3)
Reasoning and proof as addressed in the middle school curriculum. Topics include proportional reasoning, logic and proof, types of numbers, field axioms, Euclidean and non-Euclidean geometry.

MATH 314 Introduction to Probability, Data Analysis and Statistics for Pre-service Middle School Teachers (3)
Analysis of bivariate data, probability and randomness, law of large numbers, central limit theorem, probabilities for independent and dependent events, counting techniques, random variables and probability distributions, expected values, sampling distributions, and confidence intervals.

MATH 315 Algebra for Pre-service Middle School Teachers (3)
Algebraic concepts and techniques developed in the middle grades, with their larger mathematical context. Equations, inequalities and functions (linear, polynomial, exponential, logarithmic), with multiple representations of relationships. Common misconceptions of beginning algebra students.

B.II Pre-Professional Education Courses

EDPS 210 Historical and Philosophical Perspectives on Education (3)
An examination of illustrative historical and philosophical examples of the interplay of ideas and events in the shaping of educational aims and practices from ancient cultures to modern technological societies.
-or-
EDPS 301 Foundations of Education (3)
Social context of education and conflicts over philosophies, values, and goals that are reflected in educational institutions in our pluralistic society. Helps teachers become reflective, critical thinkers about the social and philosophical issues they face and the choices they make.

EDCI 280 Looking Inside Schools and Classrooms (3)
An exploration of teaching in public schools, grades 1-12: student diversity, societal chagnes, and the expectations of teachers and public schools. Three hour per week field component.

EDCI 297 Students, Schooling, and Communities (3)
Facilitates pre-service teachers' initial look at their personal backgrounds and the ways in which they view the world. Exploration of schools, students and their connections to communities. Draws on preservice teachers' concurrent field experiences.

EDHD 4XX (Middle School Version of Adolescent Development) (3) *Course in Development*
Adolescent development ages 9-13, including special problems encountered in contemporary culture.

EDHD 436 Cognition and Motivation in Reading: Reading Acquisition for Middle School Students (3)
Cognitive and motivational processes of reading and learning from texts across subjects. Structured approaches to using text for content learning based on approaches to knowledge, motivation, and strategies. Classroom contexts that enable middle school students to engage with diverse texts and Internet resources are provided.

EDCI 465 Teaching Reading in Middle School Content Areas (3)
Provides middle school teachers with understanding the need for and approaches to teaching students to read and learn from information texts in various content areas.

B. III Professional Education Courses

EDCI 360 Field Experience in Middle School (1)
A Middle-school field experience that precedes student teaching.

EDCI 411 Knowledge, Reasoning, and Learning in Science (3)
Investigations of the nature of knowledge, reasoning, and learning in middle and secondary science. Readings from cognitive science and science education research; studies of student thinking in interview and classroom observations; analyses of curricula. Includes laboratory and field experiences.

EDCI 413 Interdisciplinary Teaching in the Middle Grades I (2)
Studying and planning interdisciplinary instructional practices in middle school. Utilizes context and experiences from students' field placements. Use of technology and incorporation of technology into instruction.

EDCI 414 Interdisciplinary Teaching in the Middle Grades II (2)
Planning and implementing interdisciplinary instructional practices in middle school. Draws on the context of and experiences in the student teaching placement. Use of technology and incorporation of technology into instruction.

EDCI 424 Equitable Classrooms (2)
An exploration and application of major theoretical frameworks surrounding equity and critical pedagogy. Creating habits of mind that help teachers see all students as capable of achieving at high levels. Draws on the concurrent field experience.

EDCI 425 Equity and Pedagogy (2)
An exploration and application of major theoretical frameworks surrounding equity and critical pedagogy. Pedagogical decision making that leads to greater equity and improved student learning for all students. Draws on the concurrent student teaching experience.

EDCI 457 Teaching and Learning Middle School Mathematics (3)
Methods of teaching and assessing the middle school mathematics curriculum. Understanding the conceptual difficulties students have in moving from whole numbers to rational numbers, additive thinking to multiplicative thinking, and arithmetic to algebra. Lesson planning and selection of technology and other materials are applied in the context of supervised tutoring of students having difficulty in middle school mathematics.

EDCI 460 Student Teaching: Middle School (12)
A Middle-school student teaching experience in two content areas.

EDCI 474 Inclusion, Diversity, and Professionalism in Secondary Education (2) Discussion and analysis of critical issues relevant to teaching: inclusion, diversity, professionalism, English language learners, school politics, social justice, school-community relations, and parent engagement.

Appendix C: Content Course Requirements for Middle School Science Teaching Program Alignment with Maryland Voluntary State Curriculum

Course	Description	Mapped to Maryland Voluntary State Curriculum for Middle School
AOSC 200/201 Weather and Climate and Laboratory**	Weather observations, weather map analysis, use of the Internet, forecasting practice and climate modeling.	2.3 The student will explain how the transfer of energy and matter affect Earth systems. 6.1 The student will explain how matter and energy move through the biosphere (lithosphere, hydrosphere, atmosphere and organisms).
GEOL 100/110 Physical Geology and Laboratory**	A general survey of the rocks and minerals composing the earth, its surface features and the agents that form them, and the dynamic forces of plate tectonics.	2.1 The student will identify and describe techniques used to investigate the universe and Earth. 2.2 The student will describe and apply the concept of natural forces and apply them to the study of Earth/Space Science. Indicator 2.4 The student will analyze the dynamic nature of the geosphere. 2.5 The student will investigate methods that geologists use to determine the history of Earth.
PHYS 115 Inquiry into Physics	Use of laboratory-based and inquiry-based methods to study some of the basic ideas of physical sciences.	5.1 The student will know and apply the laws of mechanics to explain the behavior of the physical world. 5.2 The student will know and apply the laws of electricity and magnetism and explain their significant role in nature and technology. 5.3 The student will recognize and relate the laws of thermodynamics to practical applications. 5.4 The student will explain and demonstrate how vibrations and waves provide a model for our understanding of various physical phenomena.

Chart continues on next page.

BSCI 103 World of Biology or BSCI 105 or 106: Principles of Bio I & II or BSCI 122: Microbes in Society	Molecular biology, cell biology, evolution & organismal biology. Cellular and molecular biology; Organismic, ecological and evolutionary biology. Microbiology lens to introduce students to biology that they encounter in everyday life including microbes, plants, and animals including humans.	3.1 The student will be able to explain the correlation between the structure and function of biologically important molecules and their relationship to cell processes. 3.2 The student will demonstrate an understanding that all organisms are composed of cells that can function independently or as part of multicellular organisms. 3.3 The student will analyze how traits are inherited and passed on from one generation to another. 3.4 The student will explain the mechanism of evolutionary change. 3.5 The student will investigate the interdependence of diverse living organisms and their interactions with the components of the biosphere. 6.2 The student will investigate the interdependence of organisms within their biotic environment.
CHEM 131/132 Chemistry I - Fundamentals of General Chemistry and Laboratory** (formerly CHEM 103)	The Periodic Table, inorganic substances, ionic and covalent bonding, bulk properties of materials, chemical equilibrium, and quantitative chemistry.	4.1 The student will explain that atoms have structure and this structure serves as the basis for the properties of elements and the bonds that they form. Indicator 4.2 The student will explain how the properties of compounds are related to the arrangement and type of atoms they contain. 4.3 The student will apply the basic concepts of thermodynamics (thermochemistry) to phases of matter and phase and chemical changes. 4.4 The student will explain how and why substances are represented by formulas. 4.5 The student will explain that matter undergoes transformations, resulting in products that are different from the reactants.

Electives (Choose two of the following): ASTR 100/111; ASTR 101; ASTR 121; GEOG 201/211; PHYS 102/103; PHYS 106/107; PHYS 117; ANTH 220; BSCI 122; BSCI 124/125; BSCI 224; CHEM 104; ENST 200; PLSC 100; PLSC 101; AOSC 200; GEOL 124; BSCI 120; PHYS 105; ENEE 132; ENMA 150

Content Course Requirements for Middle School Mathematics Teaching Program, cont'd.

Course	Description	Mapped to Maryland Voluntary State Curriculum for Middle School
MATH 212 Elements of Number and Operations	Topics from algebra and number theory designed to provide insight into arithmetic: sets, functions, number systems, number theory; operations with natural numbers, integers, rational numbers; linear equations.	6.A.1 Apply knowledge of rational numbers and place value 6.B.1 Apply number relationships 6.C.1 Analyze number relations and compute 6.C.2 Estimation 6.C.3 Analyze ratios, proportions, or percents
MATH 213 Elements of Geometry and Measurement	Properties of geometric objects in two and three dimensions; parallel lines, curves and polygons; ratio, proportion, similarity; transformational geometry and measurement, constructions, justifications and proofs.	2.A.1 Analyze the properties of plane geometric figures 2.A.2 Analyze geometric relationships 2.C.1 Represent plane geometric figures 2.D.1 Analyze congruent figures 2.E.1 Analyze a transformation on a coordinate plane 3.B.1 Measure in customary and metric units 3.B.2 Measure angles in polygons 3.C.1 Estimate and apply measurement formulas 3.C.2 Analyze measurement relationships
MATH 214 Elements of Probability and Statistics	Permutations and combinations; probability; collecting and representing data; using statistics to analyze and interpret data.	4.A.1 Organize and display data 4.B.1 Analyze data 4.B.2 Describe a set of data 5.A.1 Identify a sample space 5.B.1 Determine the probability of an event comprised of no more than 2 independent events 5.B.2 Determine the probability of a second event that is dependent on a first event of equally likely outcomes
MATH 312 Reasoning, Justification, and Proof for Pre-service Middle School Teachers	Examines modes of reasoning and proof as addressed in the middle school curriculum. Topics covered include: developing and evaluating mathematical arguments and proofs, selecting and using various types of reasoning and methods of proof, foundations of rational numbers and application of the central ideas to proportional reasoning, distinctions among	6.C.3 Analyze ratios, proportions, and percents. 7.B.1 Justify ideas or solutions with mathematical concepts or proof

	whole numbers, integers, rational numbers, and real numbers and whether or not the field axioms hold, and the development of Euclidean and non-Euclidean geometries.	

Chart continues on next page.

MATH 314 Introduction to Probability, Data Analysis, and Statistics for Pre-service Middle School Teachers	Engages learners in mathematics with an overall aim toward development of a profound understanding of fundamental mathematics, and an understanding of the development of statistical thinking in the middle grades. Topics covered will include: analysis of bivariate data, probability and randomness, law of large numbers, probabilities for independent and dependent events, counting techniques, random variables and probability distributions, expected values, sampling distributions, informal and formal statistical inference, and confidence intervals.	5.A.1 Identify a sample space 5.B.1 Determine the probability of an event comprised of no more than 2 independent events 5.B.2 Determine the probability of a second event that is dependent on a first event of equally likely outcomes 5.C.1 Analyze the results of a probability experiment/ survey or simulation 5.C.2 Conduct a probability experiment 5.C.3 Compare outcomes of theoretical probability with the results of experimental probability 5.C.4 Describe the difference between theoretical and experimental probability 7.D.1 Relate or apply mathematics within the discipline, to other disciplines, and to life

MATH 315 Algebra for Pre-service Middle School Teachers	Examines the algebraic concepts developed in the middles grades and the larger mathematical context for these concepts. The different roles of variables will be identified: variables as specific unknowns, as quantities that vary in relationship, as parameters, and as generalized numbers. Multiple representations of relationships will be studied. The relationships investigated will include equations (linear and quadratic), inequalities (linear), systems of equations (linear), functions (linear, quadratic, exponential, logarithmic, and power functions). Algebraic reasoning used to justify conjectures related to properties of numbers.	1.A.1 Identify, describe, extend, and create patterns, functions and sequences 1.B.1 Write, simplify, and evaluate expressions 1.B.2 Identify, write, solve, and apply equations and inequalities 1.C.1 Locate points on a number line and in a coordinate plane 1.C.2 Analyze linear relationships

Across MATH 212, 213, 214, 312, 314, and 315		7.A.1 Apply a variety of concepts, processes, and skills to solve problems 7.B.1 Justify ideas with mathematical concepts or proofs (point of emphasis in MATH 312) 7.C.1 Present mathematics ideas using words, symbols, visual displays, or technology 7.D.1 Relate or apply mathematics within the discipline, to other disciplines, and to live (point of emphasis in MATH 214 and 314)

APPENDIX D: Learning Outcomes and Assessment

Learning Outcomes	**COE Conceptual Framework Theme Alignment**	**Assessment Examples**
Candidates understand the major concepts, principles, theories, and research related to young adolescent development, and they provide opportunities that support student development and learning (NMSA Standard 1).	Knowledge of Learners Diversity *Diversity* *Technology* *Research & Inquiry*	1. In EDHD 4XX (Adolescent Development) candidates study major theories of adolescent development including psychosocial, social cognitive, and cognitive development theories and take quizzes and tests that assess their understanding of the material. 2. Performance-based Assessment (PBA) (Planning and Delivery of Instruction)
Candidates understand the major concepts, principles, theories, and research underlying the philosophical foundations of developmentally responsive middle level programs and schools, and they work successfully within these organizational components (NMSA Standard 2).	Knowledge of Social and Cultural Context Knowledge of Educational Goals and Assessment *Diversity* *Technology* *Research & Inquiry*	1. In EDCI 413 candidates research a specific issue related to middle school teacher and/or learning and construct a literature review to articulate their understanding of philosophical foundations of middle level education. 2. PBA (Professionalism)
Middle level teacher candidates understand the major concepts, principles, theories, standards, and research related to middle level curriculum and assessment, and they use this knowledge in their practice (NMSA Standard 3).	Knowledge of Curriculum Knowledge of Educational Goals and Assessment Knowledge of Subject Matter *Technology* *Collaboration* *Research & Inquiry*	1. In EDCI 411 candidates review and critically analyze curriculum with an eye toward the appropriateness for middle-level science students of the scope and sequence of content, opportunities for inquiry, embedded assumptions about the nature of science, and opportunities for connections to societal issues. 2. In EDCI 457, candidates preparing tutoring plans draw on knowledge of local curriculum, the Maryland Voluntary State Curriculum and NCTM. 3. In EDCI 414 candidates collect data from their classrooms, or on their students' performance, to identify potential student concerns or

		achievements, and use this information in their instruction. 3. PBA (Assessment of Student Learning)
Middle level teacher candidates understand and use the central concepts, tools of inquiry, standards, and structures of content in their chosen teaching fields, and they create meaningful learning experiences that develop all young adolescents' competence in subject matter and skills (NMSA Standard 4).	Knowledge of Subject Matter *Research and Inquiry*	1. Content course grade point average of 3.0 or above. 2. Praxis II Test Scores 3. PBA (Knowledge of Content, Delivery of Instruction)
Middle level teacher candidates understand and use the major concepts, principles, theories, and research related to effective instruction and assessment, and they employ a variety of strategies for a developmentally appropriate climate to meet the varying abilities and learning styles of all young adolescents (NMSA Standard 5).	Knowledge of Pedagogy Knowledge of Learners Knowledge of Educational Goals and Assessment *Diversity* *Collaboration* *Technology* *Research & Inquiry*	1. In EDCI 413 candidates plan a lesson to incorporate at least two disciplines. They review their plan with classmates, teach the lesson, reflect on it and suggest modifications for the future, including suggestions for using technology to enhance instructional delivery or learning opportunities for students. 2. PBA (Planning, Delivery of Instruction, Student Teacher Interaction/Interpersonal Skills, Classroom Management and Organization)
Middle level teacher candidates understand the major concepts, principles, theories, and research related to working collaboratively with family and community members, and they use that knowledge to maximize the learning of all young adolescents (NMSA Standard 6).	Knowledge of Social and Cultural Context *Diversity* *Collaboration*	1. In EDCI 474 candidates develop a plan to collaborate with members of students families and the community and they implement and report on the plan. 2. In EDCI 424/425, candidates analyze dilemmas they face in their teaching practice that are related to equitable practice for all students. 2. PBA (Professionalism)
Middle level teacher candidates understand the complexity of teaching young adolescents, and they engage in practices and behaviors that develop their competence as professionals	Knowledge of Pedagogy Knowledge of Learners Knowledge of Educational Goals and Assessment *Diversity* *Technology* *Research & Inquiry*	1. PBA (Professionalism/Student Teacher Interaction/Interpersonal Skills) 2. In EDCI 414 candidates develop a portfolio that meets the standards outlined in the College of Education's conceptual framework and demonstrates

(NMSA Standard 7).		their understanding and continued professional commitment toward incorporating technology in their planning, implementation, and assessment of middle-level students. 3. In EDCI 425 and 474 candidates reflect on their current practices and understandings, assessing their current strengths and weaknesses in the classroom related to equitable practices and from that develop personal goals and a philosophy for continuing the work of equitable teaching in their classrooms.

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

X New Instructional Program
_____ Substantial Expansion/Major Modification
_____ Cooperative Degree Program

University of Maryland, College Park
Institution Submitting Proposal

Middle School Education
Title of Proposed Program

Bachelor of Science	**Fall 2012**
Degree to be Awarded	Projected Implementation Date
	13.1203: Middle School Education
Proposed HEGIS Code	Proposed CIP Code
Curriculum and Development (EDCI)	**Linda Valli**
Department in which program will be located	Department Contact
301-405-3117	**lrv@umd.edu**
Contact Phone Number	Contact E-Mail Address
	December 7, 2010
Signature of President or Designee	Date

I. Mission

A key aspect of the University of Maryland's mission is to engage in collaborative partnerships to develop programs that fill demonstrated needs for the State of Maryland and that are consistent with the objectives of our existing academic programs. Preparation of middle school teachers has been identified by State Superintendent of Schools Nancy S. Grasmick as a major need in Maryland public schools. Increased attention has also turned to Science, Technology, Engineering and Math (STEM) education initiatives at the national, state, and local levels, and the University System of Maryland has identified STEM education as a high priority. The University of Maryland is committed to providing increased opportunities for teacher certification, either through a B.A. or B.S. degree, or as part of a Master's Certification. Last year, we developed a Middle School Math/Science specialty within our M.Ed. with Certification in Curriculum and Instruction to begin this process. This proposal addresses the former option, through a B.S. in Middle School Education with concentrations in Mathematics and Science.

II. Characteristics of the Proposed Program

A. Educational Objectives of the Program

The proposed new degree would provide a balanced program of mathematics and science content accompanied by pedagogical preparation designed specifically to address teaching and learning in middle school. Currently, both the mathematics and science education programs do prepare candidates who wish to teach middle school, but this is done within the confines of the existing secondary education programs. As a result, candidates must complete an entire major in either mathematics or science, which leaves little opportunity to get adequate content preparation to teach two subjects in middle school – one of the National Middle School Association standards. In addition, secondary programs only prepare teachers for Grades 7-12, while this program would prepare teachers for the middle grades specified by the Maryland State Department of Education (MSDE): Grades 4-9. For the lower grades, the demands of the existing elementary education program make it difficult for candidates to receive adequate content preparation in particular subject areas.

In the future, the Department of Curriculum and Instruction (EDCI) may develop additional plans for middle school certification in mathematics or science and one of the two other areas that the state recognizes for middle school licensure—English language arts and social studies. EDCI foresees, however, that one of the areas will always be in STEM. Here we propose only the mathematics and science combination.

The program we propose builds upon the best of professional standards, model programs at the University of Georgia, Ohio State University, and the University of North Carolina, and our own long history of innovative, research-based teacher preparation. The coursework in our program explicitly requires middle school teacher candidates to integrate curriculum across traditional disciplinary boundaries by using innovative technologies and working collaboratively with fellow teachers. In addition, we draw on the expertise and findings from research grants of our own faculty to help prospective teachers find ways of accessing and assessing student thinking in order to promote cognitive growth and equitable classroom environments, especially for English language learners and special needs students.

B. Description of program as it would appear in the catalog

The Middle School Education Program (Mathematics and Science Concentration) is designed to prepare candidates to earn a Bachelor of Science degree and to meet the MSDE requirements for certification in grades

4-9, with a specific focus on mathematics and science teaching. The program prepares reflective practitioners, skilled in inquiry, with the knowledge of content, pedagogy and student learning necessary for teaching middle school mathematics and science in alignment with the National Middle School Association (NMSA), National Council for Teachers of Mathematics (NCTM), National Science Teachers Association (NSTA) standards, and the College of Education Conceptual Framework. The subject matter courses in mathematics and science are closely aligned with the State of Maryland Middle School Voluntary State Curriculum, which is based on professional association (e.g., NSTA and NCTM) content standards.

C. General requirements for degree

The B.S. in Middle School Education with the Science/Mathematics concentration requires a basic foundation in mathematics and a broad exposure to science, consistent with the expected content for middle school learners. The curriculum draws from existing introductory science courses in the College of Computer, Mathematical, and Natural Sciences (CMNS) and in Anthropology, Environmental Science and Plant Sciences, and from a suite of specialized courses in Mathematics for education majors.

In science education, the content NSTA standards call for middle grades teachers to have background in chemical, and physical, life, and earth/space sciences. This program requires students to have courses in each of those areas. In mathematics education, the content standards for teachers call for knowledge in mathematical problem solving, reasoning and proof, mathematical connections, mathematical representation, number and operation, algebra and geometry, data analysis, statistics and probability, and measurement. The six courses required in this program focus on these topics. The remaining two knowledge areas that NCTM lists for middle school teachers—calculus and discrete mathematics—are treated implicitly and at a level appropriate for middle-grade teachers. For example, several of the courses, but especially Math 315, deal with the conceptual ideas behind calculus: how quantities change, and their rates of change. Similarly, the fundamental ideas of discrete mathematics (i.e., combinatorics, recursion, and finite graphs) are distributed across and contained within the other content standards that the courses address.

D. Total number of credits and their distribution

The program includes 41-42 credits (12 courses) in the mathematics and science subject area, and 47 credits in pre-professional and professional education, for a total of 88-89 credits. Additional General Education requirements bring the total number of credits for the B.S. degree to 120. Appendix A includes a plan indicating how this program might be completed in four years.

D. List of courses by title and number

Course descriptions are included as Appendix B. Alignment between the course content and the Maryland Voluntary State Curriculum are indicated in Appendix C.

Pre-Professional/Subject Area Courses	Credits
GEOL 100/110 Physical Geology and Laboratory	4
PHYS 115 Inquiry into Physics or PHYS 121 Fundamentals of Physics I	4
BSCI 103 The World of Biology or BSCI 105 Principles of Biology I or BSCI 122 Microbes in Society	4
CHEM 131/132 Fundamentals of General Chemistry and Laboratory	4

AOSC 200/201 Weather and Climate with Laboratory	4
MATH 212 Elements of Numbers and Operations	3
MATH 213 Elements of Geometry and Measurement	3
MATH 214 Elements of Probability and Statistics	3
*MATH 312 Mathematical Reasoning and Proof for Pre-service Middle School Teachers (new course)	3
*MATH 314 Introduction to Probability, Data Analysis, and Statistics for Pre-Service Middle School Teachers (new course)	3
*MATH 315 Algebra for Pre-Service Middle School Teacher (new course)	3
One from:	**3-4**
ANTH 220 Introduction to Biological Anthropology	
ASTR 100/111 Introduction to Astronomy and Observational Astronomy Laboratory *or* ASTR 101 General Astronomy	
ASTR 121 Introductory Astrophysics II – Stars and Beyond	
BSCI I06 Principles of Biology II	
BSCI 120 Insects	
BSCI 124/125 Plant Biology and Laboratory for Non-Science Students	
CHEM 104 Fundamentals of Organic and Biochemistry	
ENST 200 Fundamentals of Soil Science	
GEOG 201/211 Geography of Environmental Systems and Laboratory	
PHYS 102/103 Physics of Music and Laboratory	
PHYS 106/107 Light, Perception, Photography, and Visual Phenomena and Laboratory	
PLSC 100 Introduction to Horticulture	
PLSC 101 Introductory Crop Science	
Subtotal	**41-42**

Pre-Professional Education Courses

EDPS 210 Historical and Philosophical Perspectives on Education *or* EDPS 301 Foundations of Education	3
EDCI 280 Introduction to Teaching**	3
EDCI 297 Schooling, Students, Families, and Communities (new course, approved)	3
EDHD 4XX Adolescent Development (a middle school version of EDHD 413)	3
*EDHD 436 Cognition and Motivation in Reading: Reading Acquisition for Middle School Students (new course being proposed)	3
*EDCI 465 Teaching Reading in Middle School Content Areas (new course Proposed)	3
Subtotal	**18**

Professional Education Courses

*EDCI 360 Field Experience in Middle School Education (new course, proposed)	1
EDCI 411 Knowledge, Reasoning, and Learning in Science	3
EDCI 413 Interdisciplinary Middle School Teaching Methods (new course, approved)	2
EDCI 414 Interdisciplinary Middle School Teaching Methods II (new course, approved)	2
EDCI 424 Equitable Classrooms (new course, approved)	2

EDCI 425 Equity and Pedagogy (new course, approved)	2
EDCI 457 Teaching and Learning Middle School Mathematics	3
*EDCI 460 Student Teaching: Middle School (course title change)	12
EDCI 474 Inclusion, Diversity, and Professionalism in Secondary Teaching	2
Subtotal	**29**
Total	**88-89**

F. Description of thesis and/or non-thesis option for graduate programs

Not Applicable

G. Expected student learning outcomes

The program's learning outcomes are driven by the National Middle School Association (NMSA) standards, and aligned with the College of Education Conceptual Framework. Appendix D summarizes the program's learning outcomes and where and how the outcomes are assessed.

H. Demonstrable quality of program faculty

Oversight and responsibility for this program will be with faculty members in the College of Education, Department of Curriculum and Instruction's (EDCI) Center for Mathematics Education and Science Teaching Center. Dr. Daniel Chazan, Associate Professor in mathematics education (Ed. D. Harvard University) and Dr. Janet Coffey, Assistant Professor in science education (Ph.D. Stanford University) will serve as the primary points of contact. Dr. Richard Hollenbeck, (Ph.D. University of Maryland in mathematics education) will serve as the coordinator. Other faculty with relevant background in the education of early adolescents (e.g., Maria Hyler, Ph.D. Stanford) will be involved in delivering the professional education courses. EDCI faculty will be advised by representatives from the Mathematics Department and science departments, such as Dr. Brian Hunt, Professor and Undergraduate Chair of Mathematics, Ph. D. Stanford University; Dr. Spencer Benson, Associate Professor, Ph.D. University of Chicago; and Dr. Joelle Presson, Assistant Dean, Ph.D. University of Oregon. Formal staffing assignments will be made by the respective Department Chairs based upon recommendations from Drs. Chazan and Coffey.

The program will be administered from the College of Education's Department of Curriculum and Instruction. The directors of the EDCI Center for Mathematics Education and the Science Teaching Center will be responsible for the academic direction and oversight. A clinical faculty member in the mathematics education unit will be primarily responsible for day-to-day administration of the program, with support from the Director of Undergraduate Advising, and Chair of EDCI. The Teacher Preparation Leadership committee has the responsibility for oversight of all teacher education programs in the department. We anticipate being able to staff the new courses with existing tenure-line and full-time clinical faculty.

I. Student audience to be served by program and enrollment estimates

The program is expected to attract 20-30 students per year, drawing from current elementary education candidates who are interested in teaching middle school mathematics and science and prospective secondary science and mathematics education candidates who do not want to commit to a full content major in either subject. Additionally, the program will attract students from other pre-professional tracks (e.g., pre-med

students or engineering students) who have decided to leave those tracks and are interested in teaching. We have identified interest in this option through a survey administered to senior education majors in Fall 2009, where approximately 15-20% of the elementary education majors indicated that they might have considered a middle school science/math education option had it been available. It is our expectation that, at least initially, students will not be new to the university, and we have therefore constructed a curriculum and budget that assumes no new tuition resources. Within the College of Education, resources will be reallocated to support the education portions of the curriculum, based on projected shifts of students among these majors. Under the assumption that each cohort will be about 25 students, 11 EDCI course sections (40 credits) currently provided for Elementary Education majors will be discontinued and replaced with 12 sections (38 credits) in the new curriculum. Somewhat smaller shifts will be required in the Departments of Human Development (EDHD) and Policy Studies (EDPS).

J. Impact on student's technology fluency

All teacher preparation programs at the University of Maryland are designed to meet the seven "Maryland State Department of Education Technology Standards. " These standards require, for example, that all of our teacher candidates are able to integrate technology into their curriculum and instruction, use assistive technology to enhance student learning, evaluate technology materials and media to determine appropriate instructional use, and understand the legal, social and ethical issues related to technology use. These standards guide course curriculum and student assessment, including (a) the quarterly performance-based assessments (PBAs) used during the students' internship year and (b) students' culminating professional portfolios. As part of their professional coursework, for example, students in the middle school program would be required to develop lessons that use technology to build understanding of important mathematical and scientific concepts. During their internship, they would demonstrate proficiency of technology use in their instructional delivery. These lessons would be assessed in their PBAs; students would reflect upon their work and evaluate their technology fluency in their portfolio submissions.

In addition, the mathematics and science courses that the middle school majors will take typically incorporate technology as part of the instruction. In their science and mathematics classes, technology is often integral to students' coursework, used to support conceptual understanding and solve problems. For example, in many of the science courses, computer simulations are used to illustrate or model complex processes, such as plate tectonics, energy transformation, chemical reaction rates and kinematics. Probes are used for data collection and measurement in laboratory settings, and data analysis software is introduced to help with large data sets. Graphing calculators are frequently used in mathematics coursework. In Math 312, as one specific example, a number of virtual interactive manipulatives are used to foster student understanding of rational numbers. Experiencing technology in their own coursework can help teacher candidates better integrate technology in their future classrooms with students.

K. Library requirements

The President assures that institutional library resources meet new program needs. Because this program draws on resources currently used in the elementary and secondary programs, there are sufficient curriculum and library resources available.

L. Facilities and equipment

The President assures that institutional facilities meet new program needs. Existing physical resources are adequate to support the proposed program. The small size of the program relative to the size of existing programs administered by EDCI means that the program will have minimal impact on the use of existing facilities and equipment.

III. Resources and Expenditures

TABLE 1: RESOURCES					
Resources Categories	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
1.Reallocated Funds[1]	$38,750	$107,250	$172,250	$172,250	$172,250
2. Tuition/Fee Revenue[2] (c+g below)					
a. # F.T. Students[1]	25	50	75	75	75
b. Annual Tuition/Fee					
c. Annual Full Time Revenue (a x b)					
d. # Part Time Students	0	0	0	0	0
e. Credit Hour Rate	0	0	0	0	0
f. Annual Credit Hours	0	0	0	0	0
g. Total Part Time Revenue (d x e x f)	0	0	0	0	0
3. Grants, Contracts, & Other External Sources			0	0	0
4. Other Sources	0	0	0	0	0
TOTAL (Add 1 - 4)	$38,750	$107,250	$172,250	$172,250	$172,250

[1] Based on discontinuation of an Elementary Education cohort of 25 students; 20 in-state, 5 out of state

TABLE 2: EXPENDITURES					
Expenditure Categories	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
1. Total Faculty Expenses (b + c below)	$39,000	$97,500	$133,250	$133,250	$133,250
a. # FTE					
b. Total Salary```````	$30,000	$75,000	$102,500	$102,500	$102,500
c. Total Benefits[2]	$9,000	$22,500	$30,750	$30,750	$30,750
2. Total Administrative Staff Expenses (b + c below)		$13,520	$22,490	$22,490	$22,490
a. # FTE		0.20	0.33	0.33	0.33
b. Total Salary		$10,400	$17,300	$17,300	$17,300
c. Total Benefits		$3,120	$5,190	$5,190	$5,190
3. Total Support Staff Expenses (b + c below)	0	0	0	0	0
a. # FTE	0	0	0	0	0
b. Total Salary	0	0	0	0	0
c. Total Benefits	0	0	0	0	0
4. Equipment	0	0	0	0	0
5. Library	0	0	0	0	0
6. New or Renovated Space				0	
7. Other Expenses			$15,000	$15,000	$15,000
TOTAL (Add 1 - 7)	$39,000	$111,020	$170,740	$170,740	$170,740

[2] Benefits calculated as 0.3 x salary

Appendix A: Middle School Academic Plan-(Math/Science)

FRESHMAN:

Fall Semester:	***Cr.***	***Spring Semester:***	***Cr.***
ENGL 101 (FE)	3	***Content A (Geol 100/110)***	4
Freshman Math	3	CORE –Lab	3
Core –SB	3	***Other Content 1 (Math 212)***	3
Core –SH	3	Core –HL	3
UNIV 101	2		
Total Credits	**14**	*Total Credits*	**13**

SOPHOMORE: ***Apply to Professional Program between 45 and 60 credits***

Fall Semester:	***Cr.***	***Spring Semester:***	***Cr.***
Content B (Phys 115)	4	**EDCI 297**	3
Other Content 2 (Math 213)	3	***Other Content 3 (Math 214)***	3
EDCI 280 (as rev. 2009)	3	***Content C (BSCI option)***	4
EDPS 310 or 210	3	CORE Diversity (D) +HA	3
Possible Elective/Core	3	Possible Elective/Core	3
Total Credits	**16**	*Total Credits*	**16**

JUNIOR YEAR:

Fall Semester:	***Cr.***	***Spring Semester:***	***Cr.***
EDHD 436 (proposed)	3	***Content E (AOSC 200/201)***	4
Content D (Chem 131/132)	4	ENGL 39_ Advanced Composition	3
Other Content 4 (Math 312)	3	***Other Content 5 (Math 314)***	3
EDHD 4XX (M.S. equivalent of EDHD 413)	3	**EDCI 465 (proposed)**	3
Content Methods (EDCI 411 or 457)	3	**Content Methods (EDCI 411 or 457)**	3
Total Credits	**16**	*Total Credits*	**16**

SENIOR YEAR

Fall Semester:	***Cr.***	***Spring Semester:***	***Cr.***
Other Content 6 (Math 315)	3	**EDCI 460 Student Teaching**	12
Content F (Sci Elective)	3	**EDCI 414**	2
EDCI 413	2	**EDCI 426**	2
EDCI 425	2		
EDCI 360 (Field Experience)	1		
EDCI 474	2		
Total Credits	**13**	*Total Credits*	**16**

* Two content area classes must be Upper Level 3xx-4xx for Advanced Studies

Total Credits: 120

Field Placements:

Freshman Year- UNIV 101 with America Counts
Sophomore Year- EDCI 280
Junior Year- Methods
Senior Year-Field Practicum, Internship

Appendix B: Middle School Education Program Required Course Descriptions

B.I Pre-Professional/Subject Area Courses

GEOL 100/110 Physical Geology and Laboratory (4)
GEOL 100: A general survey of the rocks and minerals composing the earth, its surface features and the agents that form them, and the dynamic forces of plate tectonics. GEOL 110: The basic materials and tools of physical geology stressing familiarization with rocks and minerals and the use of maps in geologic interpretations.

PHYS 115 Inquiry into Physics (4)
Intended for students majoring in neither the physical nor the biological sciences. Use of laboratory-based and inquiry-based methods to study some of the basic ideas of physical sciences.
-or-
PHYS 121 Fundamentals of Physics I (4)
The first part of a two-semester course in general physics treating the fields of mechanics, heat, sound, electricity, magnetism, optics, and modern physics. Together with PHYS122, this generally satisfies the minimum requirement of medical and dental schools.

BSCI 103 The World of Biology (4)
An introduction to modern biology for the non-science major. Major themes include molecular biology, cell biology, evolution and organismal biology. Relevance of study of biology to modern human life will be emphasized. Course not acceptable toward degree in College of Chemical and Life Sciences.
-or-
BSCI 105 Principles of Biology I (4)
Basic principles of biology with special emphasis on cellular and molecular biology.
-or-
BSCI 122 Microbes and Society (4)
Introduction to the historical, societal and conceptual aspects of microbiology and biotechnology. Course not acceptable toward major requirements in the College of Chemistry and Life Sciences.

CHEM 131/132 Chemistry I – Fundamentals of General Chemistry and Laboratory (4)
CHEM 131: An overview of the Periodic Table, inorganic substances, ionic and covalent bonding, bulk properties of materials, chemical equilibrium, and quantitative chemistry. CHEM131 is the first course in a four-semester sequence for students majoring in the sciences, other than Chemistry and Biochemistry majors. CHEM 132: Introduction to the quanitification of chemical substances, including the concept of the mole and chemical stoichiometry. Additional work involves the synthesis of ionic substances and their qualitative characterization. Must be taken concurrently with CHEM131.

AOSC 200/201 Weather and Climate and Laboratory (4)
AOSC 200: Broad survey of the state of knowledge and problems of atmospheric science. Origin and structure of the atmosphere, meteorological observations, weather maps, forecasting, satellites, energetics, wind general circulation, storms, severe weather, climate change, air pollution. AOSC 201: Laboratory exercises to supplement AOSC200, including weather observations, weather map analysis, use of the Internet, forecasting practice and climate modeling.

MATH 212 Elements of Numbers and Operations (3)
Topics from algebra and number theory designed to provide insight into arithmetic: sets, functions, number systems, number theory; operations with natural numbers, integers, rational numbers; linear equations.

MATH 213 Elements of Geometry and Measurement (3)
Properties of geometric objects in two and three dimensions; parallel lines, curves and polygons; ratio, proportion, similarity; transformational geometry and measurement, constructions, justifications and proofs.

MATH 214 Elements of Probability and Statistics (3)
Permutations and combinations; probability; collecting and representing data; using statistics to analyze and interpret data.

MATH 312 Math Reasoning and Proof (3)
Reasoning and proof as addressed in the middle school curriculum. Topics include proportional reasoning, logic and proof, types of numbers, field axioms, Euclidean and non-Euclidean geometry.

MATH 314 Introduction to Probability, Data Analysis and Statistics for Pre-service Middle School Teachers (3)
Analysis of bivariate data, probability and randomness, law of large numbers, central limit theorem, probabilities for independent and dependent events, counting techniques, random variables and probability distributions, expected values, sampling distributions, and confidence intervals.

MATH 315 Algebra for Pre-service Middle School Teachers (3)
Algebraic concepts and techniques developed in the middle grades, with their larger mathematical context. Equations, inequalities and functions (linear, polynomial, exponential, logarithmic), with multiple representations of relationships. Common misconceptions of beginning algebra students.

B.II Pre-Professional Education Courses

EDPS 210 Historical and Philosophical Perspectives on Education (3)
An examination of illustrative historical and philosophical examples of the interplay of ideas and events in the shaping of educational aims and practices from ancient cultures to modern technological societies.
-or-
EDPS 301 Foundations of Education (3)
Social context of education and conflicts over philosophies, values, and goals that are reflected in educational institutions in our pluralistic society. Helps teachers become reflective, critical thinkers about the social and philosophical issues they face and the choices they make.

EDCI 280 Looking Inside Schools and Classrooms (3)
An exploration of teaching in public schools, grades 1-12: student diversity, societal chagnes, and the expectations of teachers and public schools. Three hour per week field component.

EDCI 297 Students, Schooling, and Communities (3)
Facilitates pre-service teachers' initial look at their personal backgrounds and the ways in which they view the world. Exploration of schools, students and their connections to communities. Draws on preservice teachers' concurrent field experiences.

EDHD 4XX (Middle School Version of Adolescent Development) (3) *Course in Development*
Adolescent development ages 9-13, including special problems encountered in contemporary culture.

EDHD 436 Cognition and Motivation in Reading: Reading Acquisition for Middle School Students (3)
Cognitive and motivational processes of reading and learning from texts across subjects. Structured approaches to using text for content learning based on approaches to knowledge, motivation, and strategies. Classroom contexts that enable middle school students to engage with diverse texts and Internet resources are provided.

EDCI 465 Teaching Reading in Middle School Content Areas (3)
Provides middle school teachers with understanding the need for and approaches to teaching students to read and learn from information texts in various content areas.

B. III Professional Education Courses

EDCI 360 Field Experience in Middle School (1)
A Middle-school field experience that precedes student teaching.

EDCI 411 Knowledge, Reasoning, and Learning in Science (3)
Investigations of the nature of knowledge, reasoning, and learning in middle and secondary science. Readings from cognitive science and science education research; studies of student thinking in interview and classroom observations; analyses of curricula. Includes laboratory and field experiences.

EDCI 413 Interdisciplinary Teaching in the Middle Grades I (2)
Studying and planning interdisciplinary instructional practices in middle school. Utilizes context and experiences from students' field placements. Use of technology and incorporation of technology into instruction.

EDCI 414 Interdisciplinary Teaching in the Middle Grades II (2)
Planning and implementing interdisciplinary instructional practices in middle school. Draws on the context of and experiences in the student teaching placement. Use of technology and incorporation of technology into instruction.

EDCI 424 Equitable Classrooms (2)
An exploration and application of major theoretical frameworks surrounding equity and critical pedagogy. Creating habits of mind that help teachers see all students as capable of achieving at high levels. Draws on the concurrent field experience.

EDCI 425 Equity and Pedagogy (2)
An exploration and application of major theoretical frameworks surrounding equity and critical pedagogy. Pedagogical decision making that leads to greater equity and improved student learning for all students. Draws on the concurrent student teaching experience.

EDCI 457 Teaching and Learning Middle School Mathematics (3)
Methods of teaching and assessing the middle school mathematics curriculum. Understanding the conceptual difficulties students have in moving from whole numbers to rational numbers, additive thinking to multiplicative thinking, and arithmetic to algebra. Lesson planning and selection of technology and other materials are applied in the context of supervised tutoring of students having difficulty in middle school mathematics.

EDCI 460 Student Teaching: Middle School (12)
A Middle-school student teaching experience in two content areas.

EDCI 474 Inclusion, Diversity, and Professionalism in Secondary Education (2) Discussion and analysis of critical issues relevant to teaching: inclusion, diversity, professionalism, English language learners, school politics, social justice, school-community relations, and parent engagement.

Appendix C: Content Course Requirements for Middle School Science Teaching Program Alignment with Maryland Voluntary State Curriculum

Course	Description	Mapped to Maryland Voluntary State Curriculum for Middle School
AOSC 200/201 Weather and Climate and Laboratory**	Weather observations, weather map analysis, use of the Internet, forecasting practice and climate modeling.	2.3 The student will explain how the transfer of energy and matter affect Earth systems. 6.1 The student will explain how matter and energy move through the biosphere (lithosphere, hydrosphere, atmosphere and organisms).
GEOL 100/110 Physical Geology and Laboratory**	A general survey of the rocks and minerals composing the earth, its surface features and the agents that form them, and the dynamic forces of plate tectonics.	2.1 The student will identify and describe techniques used to investigate the universe and Earth. 2.2 The student will describe and apply the concept of natural forces and apply them to the study of Earth/Space Science. Indicator 2.4 The student will analyze the dynamic nature of the geosphere. 2.5 The student will investigate methods that geologists use to determine the history of Earth.
PHYS 115 Inquiry into Physics	Use of laboratory-based and inquiry-based methods to study some of the basic ideas of physical sciences.	5.1 The student will know and apply the laws of mechanics to explain the behavior of the physical world. 5.2 The student will know and apply the laws of electricity and magnetism and explain their significant role in nature and technology. 5.3 The student will recognize and relate the laws of thermodynamics to practical applications. 5.4 The student will explain and demonstrate how vibrations and waves provide a model for our understanding of various physical phenomena.

Chart continues on next page.

BSCI 103 World of Biology or BSCI 105 or 106: Principles of Bio I & II or BSCI 122: Microbes in Society	Molecular biology, cell biology, evolution & organismal biology. Cellular and molecular biology; Organismic, ecological and evolutionary biology. Microbiology lens to introduce students to biology that they encounter in everyday life including microbes, plants, and animals including humans.	3.1 The student will be able to explain the correlation between the structure and function of biologically important molecules and their relationship to cell processes. 3.2 The student will demonstrate an understanding that all organisms are composed of cells that can function independently or as part of multicellular organisms. 3.3 The student will analyze how traits are inherited and passed on from one generation to another. 3.4 The student will explain the mechanism of evolutionary change. 3.5 The student will investigate the interdependence of diverse living organisms and their interactions with the components of the biosphere. 6.2 The student will investigate the interdependence of organisms within their biotic environment.
CHEM 131/132 Chemistry I - Fundamentals of General Chemistry and Laboratory** (formerly CHEM 103)	The Periodic Table, inorganic substances, ionic and covalent bonding, bulk properties of materials, chemical equilibrium, and quantitative chemistry.	4.1 The student will explain that atoms have structure and this structure serves as the basis for the properties of elements and the bonds that they form. Indicator 4.2 The student will explain how the properties of compounds are related to the arrangement and type of atoms they contain. 4.3 The student will apply the basic concepts of thermodynamics (thermochemistry) to phases of matter and phase and chemical changes. 4.4 The student will explain how and why substances are represented by formulas. 4.5 The student will explain that matter undergoes transformations, resulting in products that are different from the reactants.

Electives (Choose two of the following): ASTR 100/111; ASTR 101; ASTR 121; GEOG 201/211; PHYS 102/103; PHYS 106/107; PHYS 117; ANTH 220; BSCI 122; BSCI 124/125; BSCI 224; CHEM 104; ENST 200; PLSC 100; PLSC 101; AOSC 200; GEOL 124; BSCI 120; PHYS 105; ENEE 132; ENMA 150

Content Course Requirements for Middle School Mathematics Teaching Program, cont'd.

Course	Description	Mapped to Maryland Voluntary State Curriculum for Middle School
MATH 212 Elements of Number and Operations	Topics from algebra and number theory designed to provide insight into arithmetic: sets, functions, number systems, number theory; operations with natural numbers, integers, rational numbers; linear equations.	6.A.1 Apply knowledge of rational numbers and place value 6.B.1 Apply number relationships 6.C.1 Analyze number relations and compute 6.C.2 Estimation 6.C.3 Analyze ratios, proportions, or percents
MATH 213 Elements of Geometry and Measurement	Properties of geometric objects in two and three dimensions; parallel lines, curves and polygons; ratio, proportion, similarity; transformational geometry and measurement, constructions, justifications and proofs.	2.A.1 Analyze the properties of plane geometric figures 2.A.2 Analyze geometric relationships 2.C.1 Represent plane geometric figures 2.D.1 Analyze congruent figures 2.E.1 Analyze a transformation on a coordinate plane 3.B.1 Measure in customary and metric units 3.B.2 Measure angles in polygons 3.C.1 Estimate and apply measurement formulas 3.C.2 Analyze measurement relationships
MATH 214 Elements of Probability and Statistics	Permutations and combinations; probability; collecting and representing data; using statistics to analyze and interpret data.	4.A.1 Organize and display data 4.B.1 Analyze data 4.B.2 Describe a set of data 5.A.1 Identify a sample space 5.B.1 Determine the probability of an event comprised of no more than 2 independent events 5.B.2 Determine the probability of a second event that is dependent on a first event of equally likely outcomes
MATH 312 Reasoning, Justification, and Proof for Pre-service Middle School Teachers	Examines modes of reasoning and proof as addressed in the middle school curriculum. Topics covered include: developing and evaluating mathematical arguments and proofs, selecting and using various types of reasoning and methods of proof, foundations of rational numbers and application of the central ideas to proportional reasoning, distinctions among	6.C.3 Analyze ratios, proportions, and percents. 7.B.1 Justify ideas or solutions with mathematical concepts or proof

	whole numbers, integers, rational numbers, and real numbers and whether or not the field axioms hold, and the development of Euclidean and non-Euclidean geometries.	

Chart continues on next page.

MATH 314 Introduction to Probability, Data Analysis, and Statistics for Pre-service Middle School Teachers	Engages learners in mathematics with an overall aim toward development of a profound understanding of fundamental mathematics, and an understanding of the development of statistical thinking in the middle grades. Topics covered will include: analysis of bivariate data, probability and randomness, law of large numbers, probabilities for independent and dependent events, counting techniques, random variables and probability distributions, expected values, sampling distributions, informal and formal statistical inference, and confidence intervals.	5.A.1 Identify a sample space 5.B.1 Determine the probability of an event comprised of no more than 2 independent events 5.B.2 Determine the probability of a second event that is dependent on a first event of equally likely outcomes 5.C.1 Analyze the results of a probability experiment/ survey or simulation 5.C.2 Conduct a probability experiment 5.C.3 Compare outcomes of theoretical probability with the results of experimental probability 5.C.4 Describe the difference between theoretical and experimental probability 7.D.1 Relate or apply mathematics within the discipline, to other disciplines, and to life

MATH 315 Algebra for Pre-service Middle School Teachers	Examines the algebraic concepts developed in the middles grades and the larger mathematical context for these concepts. The different roles of variables will be identified: variables as specific unknowns, as quantities that vary in relationship, as parameters, and as generalized numbers. Multiple representations of relationships will be studied. The relationships investigated will include equations (linear and quadratic), inequalities (linear), systems of equations (linear), functions (linear, quadratic, exponential, logarithmic, and power functions). Algebraic reasoning used to justify conjectures related to properties of numbers.	1.A.1 Identify, describe, extend, and create patterns, functions and sequences 1.B.1 Write, simplify, and evaluate expressions 1.B.2 Identify, write, solve, and apply equations and inequalities 1.C.1 Locate points on a number line and in a coordinate plane 1.C.2 Analyze linear relationships

Across MATH 212, 213, 214, 312, 314, and 315		7.A.1 Apply a variety of concepts, processes, and skills to solve problems 7.B.1 Justify ideas with mathematical concepts or proofs (point of emphasis in MATH 312) 7.C.1 Present mathematics ideas using words, symbols, visual displays, or technology 7.D.1 Relate or apply mathematics within the discipline, to other disciplines, and to live (point of emphasis in MATH 214 and 314)

APPENDIX D: Learning Outcomes and Assessment

Learning Outcomes	**COE Conceptual Framework Theme Alignment**	**Assessment Examples**
Candidates understand the major concepts, principles, theories, and research related to young adolescent development, and they provide opportunities that support student development and learning (NMSA Standard 1).	Knowledge of Learners Diversity *Diversity* *Technology* *Research & Inquiry*	1. In EDHD 4XX (Adolescent Development) candidates study major theories of adolescent development including psychosocial, social cognitive, and cognitive development theories and take quizzes and tests that assess their understanding of the material. 2. Performance-based Assessment (PBA) (Planning and Delivery of Instruction)
Candidates understand the major concepts, principles, theories, and research underlying the philosophical foundations of developmentally responsive middle level programs and schools, and they work successfully within these organizational components (NMSA Standard 2).	Knowledge of Social and Cultural Context Knowledge of Educational Goals and Assessment *Diversity* *Technology* *Research & Inquiry*	1. In EDCI 413 candidates research a specific issue related to middle school teacher and/or learning and construct a literature review to articulate their understanding of philosophical foundations of middle level education. 2. PBA (Professionalism)
Middle level teacher candidates understand the major concepts, principles, theories, standards, and research related to middle level curriculum and assessment, and they use this knowledge in their practice (NMSA Standard 3).	Knowledge of Curriculum Knowledge of Educational Goals and Assessment Knowledge of Subject Matter *Technology* *Collaboration* *Research & Inquiry*	1. In EDCI 411 candidates review and critically analyze curriculum with an eye toward the appropriateness for middle-level science students of the scope and sequence of content, opportunities for inquiry, embedded assumptions about the nature of science, and opportunities for connections to societal issues. 2. In EDCI 457, candidates preparing tutoring plans draw on knowledge of local curriculum, the Maryland Voluntary State Curriculum and NCTM. 3. In EDCI 414 candidates collect data from their classrooms, or on their students' performance, to identify potential student concerns or

		achievements, and use this information in their instruction. 3. PBA (Assessment of Student Learning)
Middle level teacher candidates understand and use the central concepts, tools of inquiry, standards, and structures of content in their chosen teaching fields, and they create meaningful learning experiences that develop all young adolescents' competence in subject matter and skills (NMSA Standard 4).	Knowledge of Subject Matter *Research and Inquiry*	1. Content course grade point average of 3.0 or above. 2. Praxis II Test Scores 3. PBA (Knowledge of Content, Delivery of Instruction)
Middle level teacher candidates understand and use the major concepts, principles, theories, and research related to effective instruction and assessment, and they employ a variety of strategies for a developmentally appropriate climate to meet the varying abilities and learning styles of all young adolescents (NMSA Standard 5).	Knowledge of Pedagogy Knowledge of Learners Knowledge of Educational Goals and Assessment *Diversity* *Collaboration* *Technology* *Research & Inquiry*	1. In EDCI 413 candidates plan a lesson to incorporate at least two disciplines. They review their plan with classmates, teach the lesson, reflect on it and suggest modifications for the future, including suggestions for using technology to enhance instructional delivery or learning opportunities for students. 2. PBA (Planning, Delivery of Instruction, Student Teacher Interaction/Interpersonal Skills, Classroom Management and Organization)
Middle level teacher candidates understand the major concepts, principles, theories, and research related to working collaboratively with family and community members, and they use that knowledge to maximize the learning of all young adolescents (NMSA Standard 6).	Knowledge of Social and Cultural Context *Diversity* *Collaboration*	1. In EDCI 474 candidates develop a plan to collaborate with members of students families and the community and they implement and report on the plan. 2. In EDCI 424/425, candidates analyze dilemmas they face in their teaching practice that are related to equitable practice for all students. 2. PBA (Professionalism)
Middle level teacher candidates understand the complexity of teaching young adolescents, and they engage in practices and behaviors that develop their competence as professionals	Knowledge of Pedagogy Knowledge of Learners Knowledge of Educational Goals and Assessment *Diversity* *Technology* *Research & Inquiry*	1. PBA (Professionalism/Student Teacher Interaction/Interpersonal Skills) 2. In EDCI 414 candidates develop a portfolio that meets the standards outlined in the College of Education's conceptual framework and demonstrates

(NMSA Standard 7).		their understanding and continued professional commitment toward incorporating technology in their planning, implementation, and assessment of middle-level students. 3. In EDCI 425 and 474 candidates reflect on their current practices and understandings, assessing their current strengths and weaknesses in the classroom related to equitable practices and from that develop personal goals and a philosophy for continuing the work of equitable teaching in their classrooms.