UMBC

AN HONORS UNIVERSITY IN MARYLAND

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MEMORANDUM

DATE: August 17, 2016

TO: Rosemary Drohan

FROM: Antonio Moreira, Ph.D.
Vice Provost for Academic Affairs

SUBJECT: BS Middle School STEM

Attached please find the original proposal for the BS Middle School STEM. For the sake of expediency, I am also sending copies of this information simultaneously to the Faculty Senate, the Undergraduate Council and the Academic Planning and Budget Committee. Please coordinate with Drs. Moffitt, McDonough and Nicholas to obtain the endorsement from the shared governance process.

We look forward to receiving the Faculty Senate's review.

Thank you.

AM:slm
Attachment

Cc: Dr. Kimberly Moffitt, President, Faculty Senate
Dr. Susan McDonough, Chair, Undergraduate Council
Dr. Charles Nicholas, Chair, APB
Dr. Patricia McDermott, Vice Provost for Faculty Affairs
Ms. Beth Wells (w/o attachment)

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

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

University of Maryland, Baltimore County

Institution Submitting Proposal

Bachelor of Science in Middle School STEM

Title of Proposed Program

Bachelor of Science	**Fall 2017**
Degree to be Awarded	Projected Implementation Date
Proposed HEGIS Code	Proposed CIP Code
Education Department	**Eugene C. Schaffer, Chair** **Mavis G. Sanders, Associate Chair**
Department in which program will be located	Department Contact
410-455-2466	**(schaffer@umbc.edu)** **(msanders@umbc.edu)**
Contact Phone Number	Contact E-mail Address
Signature of President or Designee	Date

A. **Centrality to institutional mission statement and planning priorities**

The Maryland State Department of Education (MSDE) has added middle school (grades 4-9) to its areas of teacher certification. To serve the UMBC students who want to specialize in STEM education at the middle school level, the UMBC education department is proposing a new Middle School STEM Education with concentrations in mathematics and science. UMBC currently certifies undergraduate teacher candidates for early childhood, elementary, or secondary teaching. The new degree program is designed to equip teacher candidates with the necessary knowledge, skills, and dispositions to become successful STEM teachers of young adolescent learners (grades 4 through 9). The main goal of the new program is one shared by UMBC and the Association for Middle Level Education (AMLE) which is to improve the educational experiences of young adolescents by providing vision, knowledge, and resources to all who serve and teach them.

The proposed Bachelor of Science in Middle School STEM Education reflects UMBC's mission in specific ways as described below.

> *"UMBC is a dynamic public research university integrating teaching, research and service to benefit the citizens of Maryland."* Maryland has consistently had a shortage of qualified teachers, particularly in the critical STEM content areas. Early-career attrition, flat teacher education graduation rates, and teacher retirements are contributing factors. The proposed Bachelor of Science in Middle School STEM Education will provide a benefit to the citizens of Maryland by increasing the number of highly qualified STEM educators available to teach children and youth in the State.
>
> *"As an Honors University, the campus offers academically talented students a strong undergraduate liberal arts foundation that prepares them for graduate and professional study, entry into the workforce, and community service and leadership."* According to the Maryland Teacher Staffing Report 2014-16, 23 of the state's 25 school districts have been designated as geographic shortage areas based on superintendents' inability to fulfill their staffing needs in critical content areas. Consequently, students with degrees and certification in STEM education are highly marketable within the state, and employment trends suggest that their marketability will continue into the foreseeable future. Thus, the proposed Bachelor of Science in Middle School STEM Education will further UMBC's mission to prepare its talented undergraduate students for entry into the workforce, community service, and leadership.

Moreover, the proposed degree program will advance UMBC's existing strategic goals for student learning. Specifically, UMBC seeks to strengthen its:

> *...[P]erformance as a research university that integrates a high-quality undergraduate education with faculty scholarship and research through a distinctive curriculum and set of experiences promoting student engagement, such as seminars, study groups, research opportunities, mentoring, advising, co-curricular learning experiences, and exposure to diversity.*

The proposed Bachelor of Science in Middle School STEM Education will be unique in the state and further distinguish UMBC as an innovative institution "with a deep commitment to undergraduate education." In addition, like all certification programs in education, the proposed degree will include specialized seminars; preK-12 classroom-based research opportunities; and field experiences and internships in diverse public schools in Baltimore City, Baltimore County, Howard County, and Anne Arundel County through the department's network of professional development schools.

B. Critical and compelling regional or statewide need as identified in the State Plan

1. The proposed Bachelor of Science in Middle School STEM Education aligns with the goals stated in "Powering Maryland Forward", USM's 10-year strategic plan. One of these goals is to, "Expand baccalaureate degree production by an additional 10,000 degrees, with particular focus on the high-need areas of science, technology, engineering, and mathematics, or STEM". The proposed bachelor's degree will add to the number of baccalaureate degrees in STEM subjects (e.g., biology, chemistry, and physics education) conferred at UMBC. The proposed bachelor's degree will also help to achieve a second and related target, which is to "Triple the number of STEM teachers graduating from USM institutions". Thus, the Bachelor of Science in Middle School STEM Education will help to meet current and future needs within the State and region.

2. In addition, the proposed degree, which will prepare middle school STEM teachers, aligns with priorities outlined in the Maryland State Plan for Postsecondary Education (MSPPE). Specifically, the MSPPE charges colleges and universities to "appropriately staff and support high-needs employment areas, such as teacher education, STEM fields, and nursing, while continuing to provide a solid core foundation of skills". The MSPPE also describes the need for undergraduate degrees that provide applied learning experiences, stating:

> ...[O]pportunities should be available for students to become intentional learners in diverse learning environments. An intentional learner is purposeful and sets clear goals.... Diverse learning environments include service learning, study abroad, and internships and externships that help bridge classroom lessons and real-life applications.

The proposed Bachelor of Science in Middle School STEM Education includes field experiences and a 100-day internship in diverse p-12 professional development schools in Anne Arundel County, Baltimore City, Baltimore County, and Howard County, helping students to connect theory, research, and practice.

C. Quantifiable & reliable evidence and documentation of market supply & demand in the region and State:

1. Education is a growth sector nationally, regionally, and in the Baltimore area. According to the Bureau of Labor Statistics, the mid-Atlantic Information Office, "Employment in education and health services increased by 2,900 since last March, the area's second-largest gain".

2. Projections of job growth provide valuable insight into future employment opportunities because each new job created is an opening for a worker entering an occupation. However, opportunities also arise when workers leave their occupations and need to be replaced. In most occupations, replacement needs provide many more job openings than employment growth does. For middle school educators, Maryland anticipates hiring 428 new teachers and having to replace an additional 487 more for a total of 915 openings between 2014 and 2016 (see Maryland Department of Labor, Licensing, and Regulations). Graduates from the proposed Bachelor of Science in Middle Grades STEM education will be prepared for employment in this critical occupational growth area in the state.

3. According to the Bureau of Labor Statistics, employment of middle school teachers is projected to grow 12 percent from 2012 to 2022, about as fast as the average for all occupations. Growth is projected due to expected increases in enrollment combined with declines in student–teacher ratios. For more information regarding the field, nationally, see Appendix A.

D. Reasonableness of program duplication:

1. No other institution of higher learning in Maryland offers a Middle Grades STEM degree. While the University of Maryland, College Park (UMCP) and Towson University offer Middle School Science and Mathematics degrees, they do not offer the broader, integrated STEM degree with required coursework in Math, Science, Engineering, and Technology. Moreover, these programs do not require as many courses in the area of concentration as the proposed program (i.e. Towson requires 21 credit hours in math and 22 credit hours in science; UMCP requires six math content courses and six science content courses). However, new education standards (e.g., Maryland College and Career Readiness Mathematical Standards, New Generation Science Standards) require that middle grade math and science teachers have an in depth understanding of these content areas so that they can engage students in meaningful, inquiry driven instruction. The proposed program has been designed to meet these new standards in mathematics and science.

2. The UMBC Bachelor of Science in Middle Grades STEM Education will provide students with a unique opportunity to develop an integrated understanding of math, science, engineering and technology. Building on UMBC's reputation in STEM, the education department will be the first in the state to offer such a program. Thus, graduates will be prepared to fill two of the State's critical needs in p-12 education – highly qualified middle school teachers, and highly qualified STEM teachers.

E. Relevance to implementation or maintenance of high-demand programs at Historically Black Institutions (HBIs)

1. Currently, no HBI in the state offers middle school certification. Like at UMBC, STEM subject area certifications are offered at the secondary level, so there is no negative impact.

2. Relevance to the Support of the Uniqueness and Institutional Identities of HBIs

The proposed bachelor's degree in Middle Grades STEM Education has the potential to produce students for advanced degree programs in STEM related fields at two Maryland HBIs –Bowie State University and Morgan State University.

F. Relevance to the support of the uniqueness and institutional identities of HBI's

Bowie State University offers a master's degree in mathematics education, and Morgan State University offers master's degree and doctoral degree programs in mathematics and science education. We will actively encourage students interested in pursuing master's degrees in math and science education to consider these HBIs.

G. Adequacy of Curriculum Design and Delivery to Related Learning Outcomes

1. The courses in the curriculum will be a combination of middle level education courses; courses in mathematics and science; and UMBC general education courses (GEPs). The Association of Middle Level Educators (AMLE) and MSDE require that middle school educators have specialized strength in a content area. The proposed content area for specialization is STEM. Students will be required to complete 41 hours of coursework in education, 57 credits of STEM coursework, and 27 credits of general education requirements (see Table 1).

Table 1. Course Number and Title	
Major Requirements – 41 credits	**Credits**
EDUC310 Inquiry into Education (Social Science GEP)*	3
EDUC311 Psychological Foundations of Education (Social Science GEP)*	3
EDUC388 Inclusion and Instruction	3
EDUC410 Reading in the Content Area I	3
EDUC411 Reading in the Content Area II	3
EDUC412M Introduction to Middle Level Teaching and Learning	3
EDUC466 School, Family, and Community Partnerships for Middle Grades STEM Success	3
EDUC431 Methods for Teaching STEM in The Middle Grades	3
EDUC454 Phase I Seminar	2
EDUC456 Phase II Internship	10
EDUC457 Phase II Seminar	2
EDUC435 - Integrated STEM Content and Pedagogy	3

STEM Content Courses-57 credits	
Math 131 - Mathematics for Elementary School Teachers I	4
Math132 -Mathematics for Elementary School Teachers II	4
Math155 - Applied Calculus	4
Stat350 - Statistics with Applications in the Biological Sciences	4
Bio141 - Foundations of Biology: Cells, Energy, and Organisms	4
Bio142 -Foundations of Biology: Ecology and Evolution	4
Bio300L - Experimental Biology Laboratory	2
Bio302 - Molecular and General Genetics	4
GES110 - Physical Geography	3
CMSC 104 - Problem Solving and Computer Programming	3
CHEM101 - Principles of Chemistry I	4
CHEM102 - Principles of Chemistry II	4
CHEM102L-Introductory Chemistry Lab I	2
PHYS111 Basic Physics I	4
PHYS112 Basic Physics II	4
ENES101-Introduction to Engineering	3
Additional General Education Requirements - (27 credits)	
ENGL100 Composition - (GEP composition)	3
Language I -(GEP-Language)	3
Language II -(GEP-Language)	3
Language III - (GEP- Language)	3
PSYC100 Introduction to Psychology (Social Science GEP)	3
AMST200H What is an American? (Arts & Humanities GEP)	3
AMST385 Teachers in American Culture (Culture GEP)	3

PHIL251 – Ethical Issues in Science and Engineering(Arts/Humanities GEP)	3
THTR242 – Presentation Skills for Non-Actors(Arts/Humanities GEP)	3

2. All the courses included in the curriculum will provide candidates with the knowledge, skills, and dispositions to be successful middle school STEM teachers in diverse settings, following standards established by the Association of Middle Level Education. Moreover, students will be prepared for teacher certification in middle grades science and mathematics, making them uniquely marketable in the state and region (See Appendix B for a description of courses required for the degree).

3. As part of an honors university experience, students will be introduced to the richness and diversity of the various academic disciplines through general education requirements. Specifically, they will be required to take a single language through the 201- level or equivalent proficiency; three social science courses; three arts and humanities courses; and one cultural studies course in addition to their coursework in mathematics, science, engineering, and technology.

4. Students will be required to take 125 credits to complete the program. The sequence of courses is based on an integration of theory and practice, and includes field experiences as well as an internship in a professional development middle school that will extend for two consecutive semesters at the end of the program. The four year plan of study will include courses aligned with accreditation standards established by the Council for Accreditation of Educator Preparation (CAEP), AMLE, and MSDE. Successful completion of all course work including the two-semester internship will be required for Maryland teaching certification. (See degree program plan in Appendix C.)

H. Adequacy of any articulation

No articulation agreements with other institutions are required for this degree.

I. Adequacy of faculty resources

Over 90% of the education courses in this degree will be taught by full-time faculty; and over 80% will be taught by full-time faculty with doctoral degrees and extensive experience in the course content they will teach. Moreover, 50% of the education courses will be taught by tenured or tenure-track faculty. The faculty's areas of expertise reflect the competencies that students will be expected to demonstrate upon completion of the degree. See Appendix D for a description of faculty characteristics.

Four full-time, tenure-track education faculty will reallocate 20% of their effort to assist with the implementation of the new degree, shown as .8 FTE in Appendix E. To complement their efforts, a new faculty member with specific research and teaching expertise in middle grades education will be hired in the second year of the program. The Expenditure Table in

Appendix E shows the costs of salary and benefits for the new faculty hire. In Year 2, the category "Other Expenses" includes costs for a start-up package for the new hire.

J. Adequacy of library resources

The President assures that appropriate library resources are available to support the needs of this program.

K. Adequacy of physical facilities, infrastructure and instructional equipment (as outlinedin COMAR 13B.02.03.13)

The President assures that appropriate physical facilities, infrastructure, and instructional equipment are available to support the needs of this program.

L. Adequacy of financial resources with documentation (as outlined in COMAR 13B.02.03.14)

The President assures that no new general funds from the State are required. The University will incur additional costs for instructors to teach extra sections, as needed, of content courses in the College of Arts, Humanities, and Social Sciences, the College of Engineering and Information Technology, and the College of Natural and Mathematical Sciences. Expenditures will also include costs for adjunct faculty in education to teach courses that current full-time faculty will not be able to teach due to new teaching commitments for the middle grades degree. Expenses will also include equipment, and library costs. These new expenditures will increase as student enrollment in the new degree program increases (see Expenditure Table in Appendix E). However, these expenditures are not outside the normal costs associated with new bachelor's degrees in STEM.

M. Adequacy of provisions for evaluation of program consistent with Regulation .15 in COMAR

Faculty Evaluation: All tenured faculty are reviewed each year during the Spring Semester by the department chair or program head using the Faculty Annual Report. Student Course Evaluation Questionnaires (SCEQs) from the previous two semesters may be included. The general criteria for the Annual Review of tenured faculty include those used for workload and merit pay reviews and are consistent with the departmental statement of Performance Expectations. A comprehensive review of faculty occurs every five years using the components involved for promotion and tenure processes. A favorable review for promotion in rank substitutes for this review."

Academic Program Review: Each UMBC program undergoes an academic program review every seven years, the purpose of which is to assess and improve the quality of the program. Following the self-study and visit by external reviewers, an action plan for continuing to enhance the quality of the program is developed and implemented by the chair and senior management, with review by UMBC's faculty governance committees."

Program and Institutional Level Evaluation: The 2009 UMBC Assessment Plan delineates roles and responsibilities for learning assessment. The plan requires that academic programs collect data and provide assessment reports to their respective College Deans every two years. The Deans summarize findings in a report that is shared with the Council of Deans. Representatives of the General Education Committee (GEC) join this meeting with the purpose of determining how well the University is assessing and achieving its institutional-level student learning outcomes. The GEC develops a report that captures highlights and proposes recommendations for improvement. The University Assessment Committee, which includes stakeholders across the University, then reviews these reports. Achievements are noted and recommendations made for moving forward.

In addition, the department has instituted a regular and systematic method to evaluate students' learning outcomes as required by the MSDE, CAEP, and certification-specific Specialized Professional Associations (SPAs). These organizations require the department to collect and use evidence of student learning outcomes to confirm and improve students' educational experiences and outcomes.

AMLE will require the department to assess students' learning and progress within the proposed bachelor's degree program according to the following standards:

Standard 1: Young Adolescent Development: Middle level teacher candidates understand, use, and reflect on the major concepts, principles, theories, and research on young adolescent development; and use that knowledge in their practice.

Standard 2: Middle Level Curriculum: Middle level teacher candidates understand and use the central concepts, standards, research, and structures of content to plan and implement curriculum that develops all young adolescents' competence in subject matter.

Standard 3: Middle Level Philosophy and School Organization: Middle level teacher 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 middle level organizational components.

Standard 4: Middle Level Instruction and Assessment: Middle level teacher candidates understand, use, and reflect on the major concepts, principles, theories, and research related to data-informed instruction and assessment.

AMLE program approval is required for MSDE and CAEP certification. See Appendix F for a description of courses and related AMLE standards.

N. Consistency with the State's minority student achievement goals

UMBC has established a commitment to diversity as one of the core principles guiding its recruitment and retention of faculty, staff, and students. The department is committed to

recruiting and graduating students that reflect the diversity of Maryland's p-12 public schools, which includes White (42.5%), African American (35.4%), Latino (12.1%), Asian (5.9%), and American Indian/Native Alaskan (4.1%) students from diverse socioeconomic backgrounds. To support the department's efforts, scholarships will be provided through the Sherman STEM Scholars Program and the Noyce Teacher Scholars program to students who commit to teaching in high-needs schools.

O. Relationship to low productivity programs identified by the Commission:

The proposed degree has no relationship to a low productivity program.

P. If proposing a distance education program, please provide evidence of the Principles of Good Practice.

No distance learning is included.

Appendix A: Employment Data for Middle Grades Teachers

Quick Facts: Middle School Teachers	
2012 Median Pay	$53,430 per year
Entry-Level Education	Bachelor's degree
Work Experience in a Related Occupation	None
On-the-job Training	Internship/residency
Number of Jobs, 2012	614,400
Job Outlook, 2012-22	12% (As fast as average)
Employment Change, 2012-22	76,000

Appendix B. Full Description of Courses for Middle Grades STEM Degree

Course Number and Title	
Major Requirements – 41 credits	**Credits**
EDUC310 Inquiry into Education This course introduces reflective practice as a foundation for the study of teaching and learning. The macro- and micro-sociocultural contexts of education across diverse settings will be examined. Students will draw upon anthropological and sociological research methods to study the dynamics of classrooms, schools and communities. (Social Science GEP)*	**3**
EDUC311 Psychological Foundations of Education The psychology of school learning will be explored. There will be an overview of theories of teaching, learning, motivation and related research, including the philosophical assumptions underlying each - within the dynamics of context of class, culture, race and gender issues. (Social Science GEP)*	**3**
EDUC388 Inclusion and Instruction The course examines the legal, philosophical and programmatic underpinnings of instructional inclusion, broadly defined.	**3**
EDUC410 Reading in the Content Area I Major approaches to teaching reading to students in grades 7 to 12. Emphasis on skills in all content areas ranging from English to science, which the secondary teacher can apply toward improving secondary students' reading ability and their attitude toward reading.	**3**
EDUC411 Reading in the Content Area II This course is designed to develop competency in the utilization of reading and writing strategies, assessments, vocabulary building, comprehension, and special-needs adaptations.	**3**
EDUC412M Introduction to Middle Level Teaching and Learning	**3**

This course is an introduction to a systematic approach to instruction for middle grades (4-9). Special emphasis is placed on formal lesson plan development, use of research-supported strategies, and methods of differentiation. The use of technology resources in instructional planning is emphasized. Students will develop skills to create meaningful learning experiences for students of diverse cultural, ethnic, linguistic and intellectual backgrounds. These skills are then practiced in actual peer teaching situations that may occur off campus.	
EDUC466 School, Family, and Community Partnerships for Middle Grades STEM Success Students examine the theory, research, and best practices on school, family, and community partnerships, with a particular emphasis on strategies to support young adolescents' success in STEM subject areas.	**3**
EDUC435 - Integrated STEM Content and Pedagogy Students will review the integrated approaches to teaching Science, Technology, Engineering, and Mathematics (STEM). Integrated STEM pedagogies include project/problem-based (PBL), design-based, and inquiry-based approaches to teaching.	**3**
EDUC431 Methods for Teaching STEM in The Middle Grades This course introduces pedagogical practices associated with the teaching and learning of integrated STEM practices at the middle levels. The course addresses ideas that include (1) middle grades science, mathematics, engineering and technology (STEM) content, (2) understanding and developing middle grades students' thinking; (3) designing, selecting, and sequencing instructional tasks and assessments for learners in the middle grades; and (4) self-reflection on learning and teaching STEM at the middle school level.	**3**
EDUC454 Phase I Seminar This seminar course provides a forum for discussing and processing Phase I Internship experiences and current topics/issues/trends in STEM teaching and	**2**

learning.	
EDUC456 Phase II Internship This intensive internship provides students with the opportunity to take progressive responsibility for teaching in their specialty area and developing professional teaching competencies in a Professional Development School with support from a mentor teacher and a university supervisor.	**10**
EDUC457 Phase II Seminar The seminar provides a forum for discussing and processing field experiences and current issues/problems in teaching and learning.	**2**
STEM Content Courses-57 credits	
Math 131 - Mathematics for Elementary School Teachers I Intended primarily for prospective elementary school teachers. Structural aspects of mathematics and the 'why' of arithmetical computations. Topics include sets, functions, logic, numbers and number systems, numeration systems, properties of mathematical operations, techniques for computation, decimals, elementary number theory, metric and non-metric geometry, elements of probability and statistics.	**4**
Math132 -Mathematics for Elementary School Teachers II A continuation of MATH132	**4**
Math155 - Applied Calculus Basic ideas of differential and integral calculus, with emphasis on elementary techniques of differentiation and integration with applications, are treated in this course.	**4**
Stat350 - Statistics with Applications in the Biological Sciences	**4**
Bio141 - Foundations of Biology: Cells, Energy, and Organisms This course for majors provides a broad overview of contemporary biological concepts.	**4**
Bio142 -Foundations of Biology: Ecology and Evolution This course provides a broad overview of contemporary biological concepts. It	**4**

is designed to prepare students for upper level biology core and elective courses. It is one of two introductory courses.	
Bio300L - Experimental Biology Laboratory An upper level course of experiments designed to give students the essential laboratory and critical thinking skills in experimental design, implementation and analysis that every biologist should know.	**2**
Bio302 - Molecular and General Genetics Modern principles of heredity have been established through studies at the molecular, cellular and organismic levels. This course explores the fundamental biology of gene structure, organization, expression, and function as deduced from analyses of viral, prokaryotic, and eukaryotic systems and the gene interactions that underlie them.	**4**
GES110 - Physical Geography Study of the principles and processes of climate, earth materials, landforms, soils and vegetation that give logic to their integrated patterns of world distribution.	**3**
CMSC 104 - Problem Solving and Computer Programming This course is designed to provide an introduction to problem solving and computer programming that does not require prior programming experience.	**3**
CHEM101 - Principles of Chemistry I An introduction to chemistry for science majors and other students who require a thorough grounding in the principles of chemistry.	**4**
CHEM102 - Principles of Chemistry II Principles of chemical and physical equilibrium, liquids and solids, elementary thermodynamics, electron and proton transfer reactions, electrochemistry, chemical kinetics and a further study of the periodic properties of the elements.	**4**
CHEM102L-Introductory Chemistry Lab I A laboratory course designed to illustrate fundamental genetic principles by experimentation.	**2**
PHYS111 Basic Physics I	**4**

Three lectures and one two-hour laboratory period a week. A general physics course intended primarily for students in psychology, biology and health related sciences.	
PHYS112 Basic Physics II Continuation of PHYS 111. Topics include electricity, magnetism, optics and modern physics.	**4**
ENES101-Introduction to Engineering Introduction to engineering that covers dimensional analysis, data analysis, professional practice, and an introduction to engineering subjects such as statics, heat transfer, and linear circuits.	**3**
Additional General Education Requirements - (27 credits)	
ENGL100 Composition - (GEP composition) A course in critical thinking, reading, and composing, with an emphasis on integrating academic research and documentation. (GEP Composition)	**3**
Language I -(GEP-Language)	**3**
Language II -(GEP-Language)	**3**
Language III - (GEP- Language)	**3**
PSYC100 Introduction to Psychology Emphases on interpretation of psychological data, biological bases of behavior, perception, learning, individual differences, personality, behavior pathology and social psychology. (Social Science GEP)	**3**
AMST200H What is an American? This course will explore the evolving question of what constitutes American identity and belonging through important readings on race, class, ethnicity, religion, immigration, gender, sexuality, freedom, and equality. (Arts & Humanities, GEP)	**3**
AMST385 Teachers in American Culture This course examines the social and cultural definitions of teachers in American culture over time. The most enduring images and constructs of teaching, and the social and cultural forces that shape and modify those	**3**

constructs over time, are identified and explored. (Culture GEP - 3)	
PHIL251 – Ethical Issues in Science and Engineering (Arts/Humanities GEP) The primary focus of the course will be inquiry into the ethical responsibilities of scientists, engineers and information technologists in today's high-tech, information-oriented society. (Art/Humanities GEP)	**3**
THTR242 – Presentation Skills for Non-Actors (Arts/Humanities GEP) An introduction to theatre performance skills that can be applied to public presentations. Emphasis is placed on developing greater expressiveness through the study of a range of acting, voice and movement techniques. Students will make presentations in class as they explore the relationship of the speaker/performer to the listener/ audience. (Art/Humanities GEP)	**3**

Appendix C - Course Plan for Middle Grades STEM Degree – 125 credits

Year 1 (Freshman)		**Year 2 (Sophomore)**		**Year 3 (Junior)**		**Year 4 (Senior)**	
Fall – 17 credits	Spring – 17 credits	Fall – 17 credits	Spring – 15 credits	Fall – 15 credits	Spring – 17 credits	Fall – 15 credits	Spring – 12 credits
ENGL100 Composition (Composition GEP) - 3	**THTR242** Presentation Skills for Non-Actors (Arts/ Humanities GEP) - 3	**EDUC310** Inquiry into Education (Social Science GEP)* - 3	**AMST385** Teachers in American Culture (Culture GEP) - 3	**AMST 200H** What Is an American? (Arts/Humanities GEP) - 3	**EDUC466** School, Family, and Community Partnerships for Middle Grades STEM Success -3	**EDUC411** Reading in the Content Area II – 3	**EDUC456** Phase II Internship - 10
PSYC100 Introduction to Psychology (Social Science GEP) - 3	**EDUC 311** Psychological Foundations of Education (Social Science GEP)* - 3	**EDUC388** Inclusion and Instruction -3	**EDUC412M** Introduction to Middle Level Teaching and Learning - 3	**PHIL251** – Ethical Issues in Science and Engineering (Arts/Humanities GEP) - 3	**EDUC410** Reading in the Content Area I - 3	**EDUC431** Methods for Teaching STEM in The Middle Grades -3	**EDUC457** Phase II Seminar - 2
Language I (GEP-Language) - 3	**Language II** (GEP-Language) - 3	**Language III** (GEP-Language) - 3	**GES110** Physical Geography 3	**ENES101** Introduction to Engineering -3	**EDUC435** Integrated STEM Content and Pedagogy - 3	**EDUC454** Phase I Seminar 2	
Math 131 Mathematics for Elementary School Teachers I 4	**Math132** Mathematics for Elementary School Teachers II 4	**Math155** Applied Calculus 4	**CHEM102** Principles of Chemistry II 4	**Stat350** Statistics with Applications in the Biological Sciences 4	**Bio302** Molecular and General Genetics 4	**CMSC 104** Problem Solving and Computer Programming - 3	

Bio141 Foundations of Biology: Cells, Energy, and Organisms 4	**Bio142** Foundations of Biology: Ecology and Evolution 4	**CHEM101** Principles of Chemistry I 4	**CHEM102L** Introductory Chemistry Lab I 2	**Bio300L** Experimental Biology Laboratory 2	**PHYS111** Basic Physics I 4	**PHYS112** Basic Physics II 4	

Appendix D. Faculty Resources

	Appt. Type	Terminal Degree	Title/Field	Academic Title/Rank	Status (e.g., full-time, part-time, adjunct)	Course(s) Taught
Nancy Berge	Non-tenure track	M.A.	Special Education	Instructor	Adjunct	EDUC388
Susan Blunck	Non-tenure track	PhD	STEM Education; Middle Grades Education	Assoc. Clinical Prof.	Full	EDUC454
Tracy Irish	Non-tenure track	M.A., ABD	STEM Education; Professional Learning Communities	Clinical Instructor	Full	EDUC430
Cheryl North	Non-tenure track	PhD	Literacy; Secondary Education	Assist. Clinical Prof.	Full	EDUC410, EDUC 411
Linda Oliva	Non-tenure track	EdD	Educational Psychology; Instructional Technology; Teacher Research	Assist. Clinical Prof.	Full	EDUC311
Christopher Rakes	Tenure - track	PhD	Mathematics Education	Assist. Prof.	Full	EDUC412;
Mavis Sanders	Tenured	PhD	School, Family, Community Partnerships; Cultural Diversity; School Reform	Prof.	Full	EDUC466
Eugene Schaffer	Tenured	EdD	Mentoring; School Effectiveness; Prof. Dev. Schools; At-Risk Youth	Prof.	Full	EDUC310
Jonathan Singer	Tenured	PhD	Science Education	Assoc. Prof.	Full	EDUC431; EDUC456/457
Michele Stites	Tenure-track	EdD	Special Education; Early Childhood Edu.	Assistant Professor	Full	EDUC388
New Faculty	Tenure-track	PhD/ EdD	Middle Grades Education	Open	Full	EDUC431; EDUC412

Appendix E. UMBC Program Enrollment, Expenditure, and Revenue Tables

	Year 1	Year 2	Year 3	Year 4	Year 5
Program Enrollment & Retention Profile (Net new students) †					
Estimated number of first-time full-time resident students	6	13	20	27	31
Estimated number of annual first-time full-time resident credit hours	188	394	619	844	956
Estimated number of first-time full-time non-resident students	0	1	2	3	3
Estimated number of annual first-time full-time non-resident credit hours	0	44	69	94	106
Estimated number of transfer full-time resident students	11	25	35	38	41
Estimated number of annual transfer full-time resident credit hours	344	781	1094	1188	1281
Total Credit Hours	531	1219	1781	2125	2344
† Overall ratio of resident to nonresident students is 9:1					
PROGRAM REVENUE					
Note: tuition rises 3% per year unless otherwise noted					
Full-time Tuition Rate (resident)	$ 8,450	$ 8,704	$ 8,965	$ 9,234	$ 9,511
Undergraduate Tuition discount rate‡	27%	27%	27%	27%	27%
Adjusted tuition rate (resident)	$ 6,169	$ 6,354	$ 6,544	$ 6,741	$ 6,943
Estimated annual revenue from full-time students (resident)	$ 37,012	$ 80,056	$ 129,576	$ 181,996	$ 212,450
Full-time Tuition Rate (non-resident)	$ 22,075	$ 22,737	$ 23,419	$ 24,122	$ 24,846
Undergraduate Tuition discount rate‡	27%	27%	27%	27%	27%
Adjusted tuition rate (non-resident)	$ 16,115	$ 16,598	$ 17,096	$ 17,609	$ 18,137
Estimated annual revenue from full-time students (non-resident)	$ -	$ 23,237	$ 37,611	$ 52,827	$ 61,667
Tuition Rate (transfer; resident students)	$ 8,450	$ 8,704	$ 8,965	$ 9,234	$ 9,511
Undergraduate Tuition discount rate‡	4.3%	4.3%	4.3%	4.3%	4.3%
Adjusted tuition rate	$8,087	$8,329	$8,579	$8,837	$9,102
Estimated annual revenue from transfer resident students	$88,954	$208,234	$300,274	$335,792	$373,171
subtotal tuition revenue	$ 125,966	$ 311,528	$ 467,461	$ 570,614	$ 647,287
Higher enrollment scenario: 125% of projected tuition revenue	$ 157,457	$ 389,409	$ 584,327	$ 713,268	$ 809,109
Lower enrollment scenario: 75% of projected tuition revenue	$ 94,474	$ 233,646	$ 350,596	$ 427,961	$ 485,465
Reallocated funds	18,296	37,690	58,231	79,970	102,961
Other Revenue Sources (i.e. grants, contracts, gifts)					
TOTAL PROJECTED REVENUE	$ 144,262	$ 311,528	$ 467,461	$ 570,614	$ 647,287
‡ Note on tuition discount rate: 1st time full-time freshman: 38.3%; Transfer & continuing students: 4.3%; All undergraduates: 27.0%; These rates apply to undergraduates only.					

	Year 1	Year 2	Year 3	Year 4	Year 5
PROGRAM EXPENDITURES					
PERSONNEL EXPENDITURES (salaries rise 4% per year unless otherwise noted)					
Faculty Positions					
Tenure Track Faculty 1	-	$70,000	$72,800	$75,712	$78,740
FT Faculty fringe (33%)	-	$23,100	$24,024	$24,985	$25,984
Reallocation of Faculty Effort (4 full-time faculty @ 20% sal+fringe)	$18,296	$37,690	$58,231	$79,970	$102,961
Half time Staff (.5 FTE)	$20,750	$21,580	$22,443	$23,341	$24,275
Staff fringe (33%)	$6,848	$7,121	$7,406	$7,702	$8,011
Part-time Faculty ($4,000)		$4,000	$12,000	$20,000	$20,000
Faculty Startup		$20,000	-	-	-
SUBTOTAL PERSONNEL EXPENDITURES	$45,894	$183,491	$196,905	$231,710	$259,971
OPERATING EXPENDITURES					
Special & Technical (i.e. honorariums, student payments)					
Communication					
Travel					
Contractual Services (i.e. marketing, printing, equipment)	$15,000	$15,450	$15,914	$16,391	$16,883
Supplies (i.e. office, research, items less than $1,000)					
Equipment Capital or Sensitive (includes AOK Library)‡	$3,000	$3,180	$3,371	$3,573	$3,787
Fixed Charges (i.e. association dues, subscriptions, rental charges)					
Infrastructure (if any)					
SUBTOTAL OPERATING EXPENDITURES	$18,000	$18,630	$19,284	$19,964	$20,670
‡ Note the annual rates of increase in library costs are 3% for book acquisitions and 9% for serial subscriptions					
College of Arts, Humanities and Social Sciences	$12,000	$28,000	$40,000	$40,000	$40,000
College of Engineering & Information Technology	$0	$7,500	$12,500	$12,500	$12,500
College of Natural & Mathematical Sciences	$30,000	$60,000	$90,000	$120,000	$150,000
SUBTOTAL IMPACT ON OTHER PROGRAMS COSTS (per CAHSS, CNMS, and CAHSS Deans)	$42,000	$95,500	$142,500	$172,500	$202,500
TOTAL DIRECT EXPENSES	$105,894	$297,621	$358,689	$424,174	$483,141
INDIRECT EXPENDITURES					
University overhead rate *(25%)*	25.00%	25.00%	25.00%	25.00%	25.00%
University overhead amount	$26,473	$74,405	$89,672	$106,044	$120,785
TOTAL DIRECT & INDIRECT EXPENSES	$132,367	$372,027	$448,361	$530,218	$603,926
Higher expense scenario: 125% of projected expenses	$165,459	$465,033	$560,451	$662,772	$754,908
Lower expense scenario: 75% of projected expenses	$99,275	$279,020	$336,271	$397,663	$452,945
TOTAL REVENUE	$144,262	$311,528	$467,461	$570,614	$647,287
NET REVENUE	$11,895	-$60,499	$19,100	$40,397	$43,361
CUMULATIVE NET	$11,895	-$48,604	-$29,504	$10,893	$54,253

Appendix F – Courses and Related AMLE Standards

Course Number and Title	Credits	AMLE Standards																
		1 A	1 B	1 C	1 D	2 A	2 B	2 C	3 A	3 B	4 A	4 B	4 C	4 D	5 A	5 B	5 C	5 D
Major – 41 credits/ Key Assignments																		
EDUC310 Inquiry into Education	3								x	x								
EDUC311 Psychological Foundations of Education	3	x																
EDUC388 Inclusion and Instruction	3		x							x	x	x	x	x				
EDUC410 Reading in the Content Area I (Check if Writing Intensive)	3			x							x	x	x	x				
EDUC411 Reading in the Content Area II	3			x							x	x	x	x	x	x	x	x
EDUC412M Introduction to Middle Level Teaching and Learning	3			x	x		x		x	x	x	x	x	x	x	x	x	x
EDUC388 Inclusion and Instruction	3																	
EDUC466 School, Family, and Community Partnerships for Middle Grades STEM Success	3			X	X				X	X		X		X			X	
EDUC431	3	x	x	x	x		x		x	x	x	x	x	x	x	x	x	

Methods for Teaching STEM in The Middle Grades																		
EDUC454 Phase I Seminar	2	x	x	x	x						x	x	x	x	x	x	x	x
EDUC456 Phase II Internship	10	x	x	x	x						x	x	x	x	x	x	x	x
EDUC457 Phase II Seminar	2	x	x	x	x						x	x	x	x	x	x	x	x
EDUC430 Integrated STEM Content and Pedagogy	3					x	x	x										
STEM Content Courses-57 credits																		
Math 131 Mathematics for Elementary School Teachers I	4					x												
Math132 Mathematics for Elementary School Teachers II	4					x												
Math155 Applied Calculus	4					x		x										
Stat350 Statistics with Applications in the Biological Sciences	4					x		x										
Bio141 Foundations of Biology: Cells,	4					x												

Energy, and Organisms																		
Bio142 Foundations of Biology: Ecology and Evolution	4					x												
Bio300L Experimental Biology Laboratory	2					x												
Bio302 Molecular and General Genetics	4					x												
GES110 Physical Geography	3					x												
CMSC 104 - Problem Solving and Computer Programming	3					x												
CHEM101 Principles of Chemistry I	4					x												
CHEM102** Principles of Chemistry II	4																	
CHEM102L** Introductory Chemistry Lab I	2																	
PHYS111 Basic Physics I	4					x												
PHYS112 Basic Physics II	4					x												
ENES101 Introduction to Engineering	3					x												
Additional General Education Requirements (27 credits)																		
ENGL100	3																	

Composition (GEP composition)																		
Language I (GEP-Language)	3																	
Language II (GEP-Language)	3																	
Language III (GEP-Language)	3																	
PSYC100 Introduction to Psychology (Social Science GEP)	3																	
AMST200H Who is an American? (Arts/Humanities GEP)	3																	
AMST385 Teachers in American Culture (Follow up to ensure culture GEP)	3																	
PHIL251 – Ethical Issues in Science and Engineering (Arts/Humanities GEP)	3																	
THTR242 – Presentation Skills for Non-Actors (Arts/Humanities GEP)	3																	