

**MOREHEAD STATE UNIVERSITY
PROGRAM REVIEW**

**PROFESSIONAL CERTIFICATION FOR
TEACHING 5-9 CANDIDATES
FOR TEACHERS CERTIFIED IN ANOTHER AREA
(non-degree certificate extension)**

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TABLE OF CONTENTS

INTRODUCTION.....	3
I. CONCEPTUAL FRAMEWORK.....	3
Learned Society Guidelines for Middle School Certification in English:	
National Council of Teachers of English.....	6
National Council for Teachers of Mathematics Outcomes.....	8
National Science Education Standards: Life Science Middle School.....	11
National Science Education Standards: Earth Science and Physical Science	
Middle School.....	14
Treatment of Curriculum Standards for Social Studies for Middle School Curriculum:	
National Council of Social Studies	16
II. PROGRAM EXPERIENCES.....	18
Matrix: Relationship of Courses to Kentucky New Teacher Standards.....	19
Cover Sheet: Initial and Advanced Programs in Middle Level Education:	
National Middle School Association Standards.....	20
Matrix: Program Standards for Programs in Middle Level Teaching.....	22
Field Experiences.....	23
KERA Initiatives.....	25
Matrix: Relationship of Courses to KERA Initiatives.....	25
III. NCATE THEMES.....	26
Matrix: Relationship of Courses to NCATE Themes.....	27
IV. ASSESSMENT.....	28
Student Teaching Application.....	28
Portfolio.....	28
V. PROGRAM FACULTY: A Teacher Education Faculty.....	30
B. English/Communications Component Faculty.....	31
C. Mathematics Component Faculty.....	32
D. Science Component: Biological Science Faculty.....	33
E. Science Component: Physical Science Component Faculty.....	34
F. Social Studies Component Faculty.....	35
VI. PROGRAM CHECKSHEET.....	36
5-9 Academic Components.....	37

INTRODUCTION

Morehead State University offers certified teachers the opportunity to extend their certification to another level. The Professional Certification for Teaching 5-9 Candidates for Teachers Certified in Another Area allow teachers to earn 5-9 classroom certification at the graduate level. Some candidates pursuing this certification are not employed as classroom teachers and enroll in the undergraduate course offerings; others are employed and take the graduate options which are more frequently available to them as night classes. The course options chosen are usually related to the convenience of the course offerings and the varied circumstances of the candidates.

I. CONCEPTUAL FRAMEWORK

This program builds on the graduates candidates' previous training to prepare them to design, implement, manage, and evaluate instruction in a manner appropriate for candidates in middle schools. It is designed to give prospective teachers a curricular knowledge, specialized knowledge in an academic disciplines, and an understanding of the developmental and learning needs of young people during this phase of their lives. Courses designed specifically for the middle grades program cover the nature and needs of early adolescence, the social and philosophical contexts, and organizations of middle schools as put forth in guidelines for the preparation of teachers from the National Middle School Association. Clinical and field experiences are integrated into coursework distributed throughout the program and culminate in a student teaching experience in middle grades classrooms.

This program is integrated into the conceptual schema provided by the College of Education's Conceptual Framework of the *Educators as Architects: Designing environments where candidates construct knowledge and develop skills*. Within this conceptual model, the program builds on the foundation of teacher preparation to nurture the development of expanded knowledge and teaching skills. While these teachers are experienced in working with learners of different ages, they are in the process of developing skills and abilities that are appropriate to use with unique learners in grades 5-9. Central to this developmental process is demonstrated growth in mastery of the areas of knowledge and skills outlined in the New Teacher Standards, Kentucky Department of Education, 1999. These standards provide a valuable framework for the extension and ongoing professional development of teachers by underscoring that the best teachers:

1. Design/plan instruction and learning climates that develop student abilities to use communication skills, apply core concepts, become self-sufficient individuals, become responsible team embers, thing and solve problems, and integrate knowledge.

2. Create a learning climates that support the development of student abilities to use communication skills, apply core concepts, become self-sufficient individuals, becomes responsible team members, thin and solve problems, and integrate knowledge;
3. Introduce/implement/manage instruction that develops student abilities to use communication skills, apply core concepts, become self-sufficient individuals, become responsible team members, think and solve problems, and integrate knowledge;
4. Assess learning and communicate learning results to candidates and others with respect to student abilities to use communication skills, apply core concepts, become self-sufficient individuals, become responsible team members, think and solve problems, and integrate knowledge;
5. Reflect on and evaluate specific teaching/learning situations and/or programs;
6. Collaborate with colleagues, parents, and other agencies to design, implement, and support learning programs that develop student abilities to use communication skills, apply core concepts, become self-sufficient individuals, become responsible team members, thing and solve problems, and integrate knowledge;
7. Evaluate their overall performance with respect to modeling and teaching Kentucky's learning goals, refine the skills and processes necessary, and implement a professional development plan;
8. Demonstrate a current and sufficient academic knowledge of certified content areas to develop student knowledge and performance in those areas.
9. Use technology to support instruction; access and manipulate data; enhance professional growth and productivity; communicate and collaborate with colleagues, parents, and the community; and conduct research.

To perform these complex, interrelated functions a range of knowledge and experiences are required. Building on the teachers' previous training, their activities in this program have been structured around three areas designed to develop the teacher's base of knowledge:

1. Developmental knowledge: developing an understanding of the developmental and learning needs of young people;
2. Pedagogical knowledge and skills: integration of the knowledge base on validated best practices in education and using these skills in day-to-day classroom situations; and
3. Specialized knowledge in an academic discipline: developing an in-depth understanding of one or more specialty area, including the structure of the discipline.

Content knowledge in an academic discipline, while important in the elementary grades, becomes even more significant for teachers who work in middle grade classrooms. This program requires that teachers demonstrate that they have an in-depth understanding of at least one specialty area. They must complete a minimum of 24 hours in one of two four approved middle grade teaching fields: mathematics, social studies, science, or language arts. Teachers who enter this program and are certified to teach in grades 8-12 in one of those areas via a major or area of concentration automatically meet this criteria; they, however, may wish to earn certification in a second area by completing 24 hours of specialized study.

The curriculum in each of the academic teaching fields have been designed to meet the middle grade standards required by the respective learned society: National Council of Teachers of Mathematics, National Council for the Social Studies, National Science Teachers Association, National Council of Teachers of English. The standards related to the preparation of middle grade professionals for each of these societies follow:

LEARNED SOCIETY GUIDELINES FOR MIDDLE SCHOOL CERTIFICATION IN ENGLISH

The "English/Communications" Academic Component for 5-9 certification is described on pages 64-65 of Morehead State University's 2000-2002 *Undergraduate Catalog*. Candidates must achieve a 2.5 GPA in a 24-hour block of courses among which is Eng 500, *Studies in English for Teachers*, the only required methods course. The matrix below applies this course and the other electives to the appropriate NCTE guidelines. For the purposes of this report, course work leading to the certification is categorized as indicated in the course key.

National Council of Teachers of English / NCATE Guidelines for Middle/Junior High and Senior High School English Language Arts Teaching 9 http://www.ggtp.org/ncate/matrix.html	Course Key 1. Lit surveys 2. Writing 3. Ling and lang 4. Adv lit elect 5. Comm elect 6. Eng Pedag"
Standards	7. Prof studies
<p style="text-align: center;">1.0 Structure of the Basic Program</p> <p>The institution establishes a specific curriculum for preservice English language arts teachers, as a result, the candidate will</p> <p>1.1 complete a specific language arts course of study;</p> <p>1.2 gain knowledge and skills through on-campus and field experiences designed to promote knowledge of theory and practice in English language arts;</p> <p>1.3 experience modeling of effective pedagogy and attitudes by college/university faculty in both English and education, and by middle/junior high and senior high school supervising teachers.</p>	1-6 6', 16
<p style="text-align: center;">2.0 Attitudes for English Language Arts</p> <p>Through modeling, advisement, instruction, related experiences, and assessment, the program promotes and strengthens professional attitudes needed by English language arts teachers; as a result, the candidate will</p> <p>2.1 demonstrate a respect for the worth and contributions of all learners;</p> <p>2.2 use the English language arts to help students become familiar with their own and others' cultures;</p> <p>2.3 engage in reflective practice and pursue continued professional growth and collaboration with colleagues;</p> <p>2.4 help students develop lifelong habits of critical thinking and judgment;</p> <p>2.5 take informed stands on issues of professional concern;</p> <p>2.6 recognize the impact that culture, societal events and issues have on teachers, students, the English language arts curriculum, and education in general;</p> <p>2.7 promote the arts and humanities in the daily lives of students.</p>	6', 6', 6*, 1-6 6', 6", 6*
<p style="text-align: center;">3.0 Knowledge of English Language Arts</p> <p>The program prepares English language arts teachers who are knowledgeable about language, literature, oral, visual, and written literacy, print and nonprint media, technology, and research theory and findings.</p> <p>3.1 The program prepares the candidate with knowledge and understanding of the English language, as a result, the candidate will</p> <p>3.1.1 show an understanding of language acquisition and development;</p> <p>3.1.2 demonstrate how reading, writing, speaking, listening, viewing, and thinking are interrelated;</p> <p>3.1.3 recognize the impact of cultural, economic, political, and social environments upon language;</p> <p>3.1.4 show a respect for and an understanding of diversity in language use, patterns, and dialects across cultures, ethnic groups, geographic regions, and social roles;</p> <p>3.1.5 show an understanding of the evolution of the English language and the historical influences on its various forms;</p> <p>3.1.6 demonstrate an understanding of English grammars;</p> <p>3.1.7 demonstrate an understanding of semantics, syntax, morphology, and phonology;</p> <p>3.1.8 show the various purposes for which language is used.</p> <p>3.2 The program prepares the candidate in the practices of oral, visual, and written literacy; as a result, the candidate will</p> <p>3.2.1 demonstrate the influence of language and visual images on thinking and composing;</p> <p>3.2.2 use writing, speaking and observing as major forms of inquiry, reflection, and expression;</p> <p>3.2.3 use the processes of composing to create various forms of oral, visual, and written literacy,</p> <p>3.2.4 use writing, visual images, and speaking for a variety of purposes and audiences;</p> <p>3.2.5 apply knowledge of language structure and conventions to creating and critiquing print and non-print texts.</p> <p>3.3 The program prepares the candidate with knowledge and understanding of reading processes; as a result, the candidate will</p> <p>3.3.1 demonstrate how to respond to and interpret what is read in different ways,</p>	2,3 1-6' 1-6* 1-6' 1, 2, 3,4 2,3 3 2, 3, 5 2,3 2,3 1-7 2, 3, 5 2, 5 2,3 1, 2,4

<p>3.3.2 demonstrate how to discover and create meaning from texts;</p> <p>3.3.3 use a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts.</p> <p>3.4 The program prepares the candidate with knowledge and understanding of different composing processes; as a result, the candidate will</p> <p>3.4.1 use a wide range of writing strategies to generate meaning and to clarify understanding;</p> <p>3.4.2 produce different forms of written discourse;</p> <p>3.4.3 demonstrate how written discourse can influence thought and action.</p> <p>3.5 The program prepares the candidate with knowledge and understanding of an extensive range of literature, as a result, the candidate will</p> <p>3.5.1 show knowledge of a broad historical and contemporary spectrum of United States, British, and world literatures, including:</p> <p>3.5.1.1 works from a range of cultures;</p> <p>3.5.1.2 works from a range of genres;</p> <p>3.5.1.3 works by female authors;</p> <p>3.5.1.4 works by authors of color;</p> <p>3.5.1.5 works written specifically for older children and young adults;</p> <p>3.5.1.6 works of literary theory and criticism.</p> <p>3.6 The program prepares the candidate with knowledge and understanding of the range and influence of print and nonprint media and technology in contemporary culture; as a result, the candidate will</p> <p>3.6.1 recognize the influence of media on culture and on people's actions and communication;</p> <p>3.6.2 construct meaning from media and non-print texts,</p> <p>3.6.3 display an understanding of the role of technology in communication.</p> <p>3.7 The program prepares the candidate with knowledge and understanding of research theory and findings in English language arts; as a result, the candidate will</p> <p>3.7.1 use major sources of research and theory (i.e., books, periodicals, reports, proceedings of professional conferences, videotapes, electronic and non-electronic data bases) to understand the relationship between research and practice;</p> <p>3.7.2 use teacher-researcher models of classroom inquiry;</p>	<p>1, 2, 4</p> <p>1,4</p> <p>2</p> <p>2</p> <p>2</p> <p>1, 4</p> <p>1, 4</p> <p>1,4</p> <p>1, 4</p> <p>1, 4</p> <p>6</p> <p>4</p> <p>2, 5</p> <p>2, 5</p> <p>2, 5</p> <p>3, 4, 6*, 7</p> <p>6*, 7</p>
<p style="text-align: center;">4.0 Pedagogy for English Language Arts</p> <p>The program enables the candidate to acquire and demonstrate the dispositions and capacities needed to integrate knowledge of English language arts, students, teaching, and practice; as a result, the candidate will</p> <p>4.1 examine, evaluate, and select resources, such as textbooks, other print materials, video, film, recordings, and software which support the teaching of English language arts;</p> <p>4.2 design instruction to meet the needs of all students and provide for students' continuous progress and success;</p> <p>4.3 organize classroom environments and learning experiences that promote effective whole class, small group, and individual work;</p> <p>4.4 develop interdisciplinary teaching strategies and materials;</p> <p>4.5 create learning environments which promote respect for and support of individual differences of ethnicity, race, language, culture, gender, and ability;</p> <p>4.6 incorporate technology and print/non-print media into instruction;</p> <p>4.7 engage students in discussion for the purposes of interpreting and evaluating ideas presented through oral, written, or visual forms;</p> <p>4.8 encourage students to respond critically to different media and communications technologies;</p> <p>4.9 use instruction that promotes understanding of varied uses and purposes for language in communication;</p> <p>4.10 engage students in making meaning of texts through personal response;</p> <p>4.11 provide students with appropriate reading strategies that permit access to and understanding of a wide range of print and non-print texts;</p> <p>4.12 use assessment as an integral part of instruction and learning.</p> <p>4.12.1 develop and use a variety of formal and informal assessment activities and instruments to evaluate processes and products;</p> <p>4.12.2 employ a variety of means to interpret and report assessment methods and results to students, administrators, parents, and other audiences.</p>	<p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p> <p>6*, 7</p>
<p style="text-align: center;">5.0 Field-Based Experiences in English Language Arts</p> <p>The program requires field-based experiences which have clearly defined roles and expectations for student teachers, cooperating teachers, and college or university supervisors; as a result, the candidate will</p> <p>5.1 participate throughout the teacher education program in a sequence of field experiences in English language arts classrooms with certified/licensed, experienced teachers,</p> <p>5.2 spend at least ten weeks demonstrating the use of effective pedagogy during student-teaching in English language arts classrooms mentored by certified/licensed, experienced teachers and university/college supervisors; as a result, the candidate will</p> <p>5.2.1 respond to systematic evaluation in order to meet expectations and responsibilities for the student teaching experience;</p> <p>5.2.2 participate in professional organizations, conferences, and inservice workshops to continue professional growth;</p> <p>5.2.3 submit a student-teaching portfolio that provides documentation of reflective practices and teaching/learning processes.</p>	<p>6*, 7</p> <p>7</p> <p>7</p> <p>7</p>

NATIONAL COUNCIL FOR TEACHERS OF MATHEMATICS OUTCOMES MATHEMATICS IN INITIAL PROGRAMS FOR GRADES 5-8 MATHEMATICS TEACHERS

A high school background of 4 years of mathematics, including the equivalent of two years of algebra and a year of geometry, is assumed. A college program that totals 24 semester hours of mathematics and mathematics education should be sufficient to allow successful completion of the outcomes listed below.

Please list the mathematics requirements, including the course number and title, for prospective teachers preparing to teach mathematics in grades 5-9.

	<u>Course Number</u>	<u>Course Title</u>	<u>No. of Hours</u>
1.	Math 141	Trigonometry, or	
2.	Math 174	Precalculus	3
3.	Math 152	College Algebra	3
4.	Math 231	Math for Elementary Teacher I	3
5.	Math 232	Math for Elementary Teacher II	3
6.	Math 300	Intro. to Mathematical Proof	3
7.	Math 332	Introduction to Finite Math	3
8.	Math 370	College Geometry I	3
9.	CIS 202	Structured Programming/BASIC	3

Please list the mathematics methods requirements, including the course number and title, for prospective teachers preparing to teach mathematics in grades 5-9.

	<u>Course Number</u>	<u>Course Title</u>	<u>No. of Hours</u>
1.	Math 402	Integrated Biology/Math/Phys Sci. Teaching Methods	3
2.	Math 403	Integrated Biology/Math/Phys Science Field Experiences in Teaching	3

5-9 Outcomes		Evidence: performance data, experiences, courses
1.5	Programs prepare prospective teachers who can --	
1.5.1	apply concepts of number, number theory, and number systems;	Math 152 College Algebra, Math 141 Trigonometry, and Math 231 Math for Elem. Teachers I
1.5.2	apply numerical computation and estimation techniques and extend them to algebraic expressions;	Math 231 Math for Elem. Teachers I
1.5.3	apply the process of measurement to two- and three-dimensional objects using customary and metric units;	Math 232 Math for Elem. Teachers II

5-9 Outcomes	Evidence: performance data, experiences, courses
1.5.4 use geometric concepts and relationships to describe and model mathematical ideas and real-world constructs;	Math 232 Math for Elem. Teachers II, Math 370 College Geometry I
1.5.5 use both descriptive and inferential statistics to analyze data, make predications, and make decisions;	Math 232 Math for Elem. Teachers II, Math 332 Intro. to Finite Math
1.5.6 interpret probability in real-world situations, construct sample spaces, model and compare experimental probabilities with mathematical expectations, use probability to make predications;	Math 232 Math for Elem. Teachers II, Math 332 Intro. to Finite Math
1.5.7 use algebra to describe patterns, relations, and functions, and to model and solve problems;	Math 152 College Algebra, Math 141 Trigonometry
1.5.8 understand the role of axiomatic systems and proofs in different branches of mathematics, such as algebra and geometry;	Math 300 Intro. to Mathematical Proof
1.5.9 understand calculus as modeling dynamic change, including an intuitive understanding of differentiation and integration and apply calculus concepts to real-world settings;	
1.5.10 understand the major concepts of Euclidean geometry from a variety of perspectives including coordinate and transformational;	Math 370 College Geometry I
1.5.11 use mathematical modeling to solve real-world problems;	Math 332 Intro. to Finite Math, Math 152 College Algebra, Math 174 Precalculus
1.5.12 use counting to enumerate and order; use matrices, finite graphs, and trees to model problem situations; describe basic algorithms for accomplishing tasks;	Math 332 Intro. to Finite Math, Math 232 Math for Elem. Teachers II
1.5.13 understand and apply the concepts of proportional reasoning.	Math 152 College Algebra
1.6 Programs prepare prospective teachers who have a knowledge of historical development in mathematics that includes the contributions of underrepresented groups and diverse cultures.	Math 402 Integrated Bio/Math/Phy. Science Teaching Methods

Teaching Preparation

5-9 Outcomes	Evidence: performance data, experiences, courses
2.4 Programs prepare prospective teachers who can identify, teach, and model problem solving in grades 5-8.	Math 402 Integrated Bio/Math/Phy. Science Teaching Methods
2.5 Programs prepare prospective teachers who use a variety of physical and visual materials for exploration and development of mathematical concepts in grades 5-8.	Math 231 Math for Elem Teachers I, Math 232 Math for Elem. Teachers

5-9 Outcomes		Evidence: performance data, experiences, courses
2.6	Programs prepare prospective teachers who use a variety of print and electronic resources.	Math 402 Integrated Bio/Math/Phy. Science Teaching Methods
2.7	Programs prepare prospective 5-8 teachers who know when and how to use student groupings such as collaborative groups, cooperative learning, and peer teaching.	Math 402 Integrated Bio/Math/Phy. Science Teaching Methods
2.8	Programs prepare prospective teachers who use instructional strategies based on current research as well as national, state, and local standards relating to mathematics instruction.	Math 402 Integrated Bio/Math/Phy. Science Teaching Methods
2.9	Programs prepare prospective teachers who can work on an interdisciplinary team and in an interdisciplinary environment.	Math 402 Integrated Bio/Math/Phy. Science Teaching Methods
2.10	Programs introduce and involve prospective teachers in the professional community of mathematics educators.	Math 402 Integrated Bio/Math/Phy. Science Teaching Methods
3.0 FIELD-BASED EXPERIENCES		
3.1	Programs provide prospective teachers with a sequence of planned opportunities prior to student teaching to observe and participate in 5-8 mathematics classrooms with qualified teachers. Experiences include observing, tutoring, miniteaching, and planning mathematics activities and lessons for different mathematics courses.	Math 403 Integrated Bio., Math, and Phy. Science Field Experience in Teaching
3.2	Programs provide prospective teachers with a full-time student teaching experience in 5-8 mathematics that is supervised by a qualified teacher and a university or college supervisor with a 5-8 mathematics teaching experience.	Math 403 Integrated Bio, Math, and Phy. Science Field Experience in Teaching
3.3	Programs provide prospective teachers with time to confer with the supervising teacher and to do instructional planning.	Math 403 Integrated Bio, Math, and Phy. Science Field Experience in Teaching

NATIONAL SCIENCE EDUCATION STANDARDS

CONTENT STANDARDS FOR LEVELS 5-8, JULY 5, 2002

Life Science Middle School

Content Standard: As a result of their activities in grades 5-8, all students should develop understanding of

- Structure and function in living systems
- Reproduction and heredity
- Regulation and behavior
- Populations and ecosystems
- Diversity and adaptations of organisms

Developing Student Understanding

In the middle-school years, students should progress from studying life science from the point of view of individual organisms to recognizing patterns in ecosystems and developing understandings about the cellular dimensions of living systems. For example, students should broaden their understanding from the way one species lives in its environment to populations and communities of species and the ways they interact with each other and with their environment. Students also should expand their investigations of living systems to include the study of cells. Observations and investigations should become increasingly quantitative, incorporating the use of computers and conceptual and mathematical models. Students in grades 5-8 also have the fine-motor skills to work with a light microscope and can interpret accurately what they see, enhancing their introduction to cells and microorganisms and establishing a foundation for developing understanding of molecular biology at the high school level.

Some aspects of middle-school student understanding should be noted. This period of development in youth lends itself to human biology. Middle-school students can develop the understanding that the body has organs that function together to maintain life. Teachers should introduce the general idea of structure-function in the context of human organ systems working together. By middle-school, most students know about the basic process of sexual reproduction in humans, but might have misconceptions about the role of sperm and eggs and about the sexual reproduction of flowering plants. Concerning heredity, younger middle-school students tend to focus on observable traits, and older students have some understanding that genetic material carries information.

Students understand ecosystems and the interactions between organisms and environments well enough by this stage to introduce ideas about nutrition and energy flow. If asked about common ecological concepts, such as community and competition between organisms, teachers are likely to hear responses based on everyday experiences rather than scientific explanations. Teachers should use the students' understanding as a basis to develop the scientific understanding.

Understanding adaptation can be particularly troublesome at this level. How organisms undergo evolutionary change in response to ever changing environments is essential.

GUIDE TO THE CONTENT STANDARDS

Structure and Function in Living Systems

Living systems at all levels of organization demonstrate the complementary nature of structure and function. Important levels of organization for structure and function include cells, organs, tissues, organ systems, whole organisms, and ecosystems.

All organisms are composed of cells--the fundamental unit of life. Some organisms are single cells, others, including humans, are multi-cellular.

Cells carry on the many functions needed to sustain life. They grow and divide, thereby producing more cells. This requires that they take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or an organism needs.

Specialized cells perform specialized functions in multi cellular organisms. Groups of specialized cells cooperate to form a tissue, such as a muscle. Different tissues are in turn grouped together to form larger functional units, called organs. Each type of cell, tissue, and organ has a distinct structure and set of functions that serve the organism as a whole.

The human organism has systems for digestion, respiration, reproduction, circulation, excretion, movement, control, and coordination, and for protection from disease. These systems interact with one another.

Disease is a breakdown in structures or functions of an organism. Some diseases are the result of intrinsic failures of the system. Others are the result of damage by infection by other organisms.

Reproduction and Heredity

Reproduction is a characteristic of all living systems and is essential to the continuation of every species. Some organisms reproduce asexually, others reproduce sexually.

In many species, humans to plants, females produce eggs and males produce sperm, which unite to begin development of a new individual. That new individual receives genetic information from its mother (via the egg) and its father (via the sperm). Sexually produced offspring never are identical to either of their parents.

Every organism requires a set of instructions for specifying its traits. Heredity is the passage of these instructions from one generation to another.

Hereditary information is contained in genes, located in the chromosomes of each cell. Each gene carries a single unit of information. An inherited trait of an individual can be determined by one or by many genes, and a single gene can influence more than one trait. A human cell contains many thousands of different genes.

The characteristics of an organism can be described in terms of a combination of traits. Some traits are inherited and others result from interactions with the environment.

Regulation and Behavior

All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.

Regulation of an organism's internal environment involves sensing the internal environment and changing physiological activities to keep conditions within the range required to survive.

Behavior is one kind of response an organism can make to an internal or environmental stimulus. A behavioral response requires coordination and communication at many levels, including cells, organ systems, and whole organisms. Behavioral response is a set of actions determined in part by heredity and in part from experience.

An organism's behavior evolves through adaptation to its environment. How a species moves, obtains food, reproduces, and responds to danger are based in the species' evolutionary history.

Populations and Ecosystems

A population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.

Populations of organisms can be categorized by the function they serve in an ecosystem. Plants and some micro-organisms are producers--they make their own food. All animals, including humans, are consumers, which obtain food by eating other organisms. Decomposers, primarily bacteria and fungi, are consumers that use waste materials and dead organisms for food. Food webs identify the relationships among producers, consumers, and decomposers in an ecosystem.

For ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism to organism in food webs.

The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.

Diversity and Adaptations Of Organisms

Although different species might look dissimilar, the unity among organisms becomes apparent from an analysis of internal structures, the similarity of their chemical processes, and the evidence of common ancestry.

Biological evolution accounts for the diversity of species developed through gradual processes over many generations. Species acquire many of their unique characteristics through biological adaptation, which involves the selection of naturally occurring variations

in populations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.

Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival. Extinction of species is common; most of the species that have lived on the earth no longer exist.

Biology Science Electives and National Science Standards for Level 5-8

National Standards	Biol 110	Biol 150	Biol 210	Biol 215	Biol 351	Biol 352	Biol 402	Biol 403
Structure and Function in Living Systems	X	X	X	X	X	X	X	X
Reproduction and Heredity	X	X		X			X	X
Regulation and Behavior	X	X		X		X	X	X
Populations and Ecosystems	X	X	X	X	X	X	X	X
Diversity and Adaptations of Organisms	X	X	X	X	X	X	X	X

NATIONAL SCIENCE EDUCATION STANDARDS CONTENT STANDARDS FOR LEVELS 5-8, AUGUST 1, 2002

Earth Science and Physical Science Middle School

Content Standard: As a result of their activities in grades 5-8, all students should develop an understanding of

- Atmospheric processes and the water cycle
- Earth's composition and structure
- Composition and structure of the universe and the Earth's place in it
- Structure and properties of matter
- Sources and properties of energy
- Forces and motion

Developing Student Understanding

"The science education standards define the scientific understandings and abilities that all students should develop. How students attain the goals set forth in the draft standards is the responsibility of parents, teachers, schools, and communities. A different type of learning environment than what currently exists in most school systems is envisioned in the draft standards: the classroom becomes a 'community' in which students will learn science by actively engaging in inquiries; teachers will be assisted and empowered to make decisions about what students learn, how they learn it, and how resources are allocated."

"Memorizing a few scientific terms and definitions is not particularly interesting or exciting to students and does not make a person scientifically literate," said Bruce M. Alberts, president of the National Academy of Sciences and chair of the National Research Council. "By engaging students in hands-on, intellectually stimulating activities and encouraging them to ask questions and think critically, learning science becomes enjoyable and exciting. And by learning in this way, students will develop skills that will help them make more informed decisions throughout their lives."

"The draft emphasizes that all students should have the opportunity to achieve an understanding of science. Understanding is demonstrated by the ability to use knowledge and experience to solve problems, to explain phenomena in the natural world, and to be able to evaluate alternative explanations and solutions. In order for students to achieve this level of understanding, science teaching must involve students in inquiry-oriented investigations in which they interact both with peers and with the teacher, and engage in problem solving, planning, decision making, and group discussions. Learning science is something that students do, not something that is done to them. Using this principle means shifting emphasis from teachers presenting information and covering science topics to students learning science through active involvement.

Our curriculum is designed to meet the national standards and is revised when those standards change or are revised.

Earth & Physical Science Electives and National Standards for Level 5-8

National Standards	Chem 101 & 101L	Chem 201 & 201L	Phys 110	Phys 201 & 201L	Phys 202 & 202L	Geos 108	Geos 201	Sci 402	Sci 403	Sci 570
Atmospheric processes and the water cycle	X	X				X		X	X	X
Earth's composition and structure			X			X	X	X	X	X
Composition and structure of the universe and the Earth's place in it			X	X				X	X	
Structure and properties of matter	X	X		X	X			X	X	
Sources and properties of energy	X	X		X	X			X	X	
Forces and motion				X	X			X	X	

Treatment of Curriculum Standards for Social Studies for Middle School Certification
NATIONAL COUNCIL OF SOCIAL STUDIES

Required History Courses					
Standards	Courses				
	201 210	202	220		
I. Culture	X	X	X		
II. Time, C	X	X	X		
III. People	X	X	X		
IV. Individual Development & Identity		X			
V. Individual	X	X	X		
VI. Power,	X	X	X		
VII. Production, Distribution, & Consumption	X	X			
VIII. Science, Technology, & Society	X	X	X		
IX. Global	X	X	X		
X. Civic Ideas and Practice			X		
Required Government Course					
	141				
I. Culture	X				
II. Time, C	X				
III. People	X				
IV. Individual Development & Identity					
V. Individual	X				
VI. Power,	X				
VII. Production, Distribution, & Consumption					
VIII. Science, Technology, & Society					
IX. Global	X				
X. Civic Ideas and Practice	X				
Required Geography Courses					
	300				
I. Culture	X				
II. Time, C	X				
III. People	X				
IV. Individual Development & Identity					
V. Individual	X				
VI. Power,	X				
VII. Production, Distribution, & Consumption	X				
VIII. Science, Technology, & Society	X				
IX. Global	X				
X. Civic Ideas and Practice	X				

Required Economics Courses					
	101	201			
I. Culture					
II. Time, C	X	X			
III. People	X	X			
IV. Individual Development & Identity					
V. Individual	X	X			
VI. Power,	X	X			
VII. Production, Distribution, & Consumption	XX	XX			
VIII. Science, Technology, & Society	XX	XX			
IX. Global	X	X			
X. Civic Ideas and Practice					
Required Sociology Courses					
	203	205	305	354	374
I. Culture					
II. Time, C	X	X	X	X	X
III. People	X	X	X	X	X
IV. Individual Development & Identity	X	X	X	X	X
V. Individual	X	X	X	X	X
VI. Power,	X	X	X	X	X
VII. Production, Distribution, & Consumption					
VIII. Science, Technology, & Society					
IX. Global	X	X	X	X	X
X. Civic Ideas and Practice	X	X	X	X	X

The Professional Certification Program for Teaching 5-9 Students for Teachers Certified in Another Area fully embraces the concepts underlying the theme of the Conceptual Framework: *Educators as Architects: Designing environments where candidates construct knowledge and develop skills*. Enabling middle grade learners to construct knowledge is imperative at their stage of development. Arranging the learning environment so candidates may interact openly with both their teachers and peers as they construct and question new knowledge and build upon old knowledge capitalizes on the social, emotional, physical, and intellectual characteristics preadolescents. While teaching from a constructivist viewpoint is vital for learning to occur with candidates of all ages, it is particularly important for middle grades learners as they begin to move from concrete to abstract thinking.

II. PROGRAM EXPERIENCES

The candidate graduating from the middle grades program (5-9) must have a satisfactory level of achievement in relation to the *New Teacher Standards for Preparation and Certification*. The substance of each standard is taught in more than one course and is taught at an increasing level of complexity. Candidates are required to apply their learning in relation to each standard in clinical and field experiences. The teaching of the content of each standard is enhanced by the use of technology and candidates are expected to use the same technology to assist their learning and eventually their teaching. The following matrix demonstrates the integration of New Teacher Standards with course content.