

Morehead State University

Program Review

Bachelor of Science – Secondary Teacher Certification

Mathematics 8 - 12

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1. College of Education's Conceptual Framework

The conceptual framework on which the initial secondary mathematics education program is based is "Educators as Architects: Designing Environments Where Students Construct Knowledge and Develop Skills" and can be found at the following Morehead State University web address:
<http://msucoe.org/conceptframe.html>.

The architect metaphor in the title of MSU's Conceptual Framework is used for three reasons:

- a. It strikes a balance between the educator as key actor in the traditional classroom and the educator as passive observer in the romanticized classroom. It also implies that the educator is central to the planning and preparation of classroom activities but the student is the active doer of the work of learning (Blythe, Allen, Schieffelin, 1997).
- b. It suggests that educators are not merely the implementers of canned learning materials created by others. They themselves are the artists, creating environments specific to the needs of their pre-service teachers at a particular time and using a variety of appropriate materials (Tomlinson, Callahan, 1997).
- c. Constructivist theory implies that "learners construct their own knowledge by testing ideas and approaches based on their prior knowledge and experience, applying these to a new situation and integrating the knowledge gained with pre-existing intellectual constructs" (Piaget, 1952).

Methods courses designed specifically for the secondary mathematics program cover the nature and needs of various types of students; the issues surrounding changes in mathematics education; curriculum, instruction, and assessment in the secondary schools; and issues of professional collaboration in the secondary schools, including an introduction to professional organizations such as the National Council of Teachers of Mathematics (NCTM). Clinical and field experiences are integrated and distributed into the coursework throughout the program and culminate in a twelve-week student teaching experience in a secondary school classroom.

Relationship Between Secondary Mathematics Teacher Education and Conceptual Framework

The initial mathematics education program at Morehead State University prepares teachers to design, implement, manage, and evaluate instruction in a manner appropriate for students in secondary schools. The philosophies of both the Kentucky Education Reform Act (KERA) as well as the National Council of Teachers of Mathematics (NCTM) Standards are reflected in this teacher preparation program. It is designed to give prospective teachers a broad-based education, an in-depth content knowledge of mathematics, and an understanding of learning theory, especially constructivism, as it relates to teaching students at the secondary level. The secondary mathematics teacher education program is located in the Department of Mathematical Sciences. All mathematics majors are required to achieve the following mathematical competencies.

- d. The candidate exiting the programs in mathematics must be able to analyze and solve problems in the areas of algebra, analysis, statistics, and geometry. The candidate should be able to work individually and as a member of a team. Depending on the program emphasis, the candidate should possess the concept comprehension skills at a sufficient level of expertise to function

successfully as a teacher of mathematics, as a contributing member in business or industry, or as a graduate student pursuing an advanced degree in mathematics.

- e. The candidate must be able to use technology as an aid in the solution of problems. Specifically, the candidate must be able to write and effectively use programs for computers and programmable or graphing calculators.
- f. The candidate must develop appropriate learning skills to foster the investigation of mathematical ideas and direct his/her own learning.
- g. The candidate must be able to communicate the mathematical ideas learned in the program. This ability must exist in both written and oral forms of communication.

The four competencies (d – g) described above are consistent with the National Council for Teachers of Mathematics' (NCTM) Themes of Problem Solving, Reasoning, Communication and Connections.

The following portions of course syllabi are included here to illustrate the integration of the institutional conceptual framework into the secondary mathematics teacher education program.

MATH 402: Integrated Biology, Mathematics, and Physical Science
Teaching Methods
<http://msucoe.org/syllabispring.html>

Catalog Description: BIO/MATH/SCI 402. Biology, Mathematics, and Physical Sciences Teaching Methods. (2-2-3); I. Methods course for students who desire to become teachers of middle or secondary school biology, physical science or mathematics. The course provides integrated and content specific clinical experiences designed to prepare the candidate for student teaching and their subsequent role as a classroom teacher. Secondary pre-service teachers must take this course concurrently with Math 403.

MATH 403: Integrated Biology, Mathematics, and Physical Sciences
Field Experiences in Teaching
<http://msucoe.org/syllabispring.html>

Catalog Description: BIO/MATH/SCI 403. Integrated Biology, Mathematics, and Physical Sciences Field and Experiences in Teaching. (1-4-3); Course provides structured field experiences for students who desire to become teachers of middle school and secondary school biology, physical science or mathematics. The course provides guided field experiences to acclimate the student into the culture of teaching. Secondary pre-service teachers must take this course concurrently with Math 402.

Relationship Between Professional Education Core and the Conceptual Framework

The professional education core courses are required for all Secondary Teacher Education Preparation Candidates. The content and experiences aligned with these courses are linked to the conceptual framework and its theme "Educators as Architects:

Designing Environments Where Students Construct Knowledge and Develop Skills” in a number of ways. The core courses are designed to prepare candidates with the knowledge, skills, and dispositions that are essential for new teachers.

More specifically, the coursework required to complete this aspect of the preparation program is presented sequentially to best ensure that candidates are ready to use and apply essential knowledge, skills, and dispositions in their chosen field of study (content area). Engaging students in education content, a variety of learning experiences (including; but not limited to, direct learning, problem solving, application, and practice activities) are an important aspect of this part of the secondary teacher preparation program.

The nature of candidate accountability varies a great deal because the core includes both introductory and exit coursework. Demonstrating an understanding of such things as the New Teacher Standards (NTS), Core Content, Learner Goals and Expectations, and the characteristics of learners (including diversity and exceptionality) is expected. The ability to effectively apply this knowledge is required during the student teaching semester.

Technology skills (computer, video camera use, and media support equipment) are developed and used in a variety of ways throughout the Professional Development Core. The intention is to challenge candidates to use a variety of technological resources effectively as part of the planning, teaching, assessment, and communication aspects of teaching.

Reflection is a skill that is introduced in the Professional Core, refined in the academic discipline, and embedded in the student teaching semester. The intention is to support the candidates’ ability to self-evaluate, accept responsibility for, and ultimately to improve their teaching. Input from classroom instructors, MSU supervisors and public school teachers further refines the candidates’ ability to construct environments that provoke thought and action in the classroom (Reiman,1999). Learning to identify meaningful professional activities is an extension of the self-evaluation and teaching improvement process.

The concept of collaboration is introduced early in the Professional Development Core and the ability to effectively collaborate is required during the student teaching experience, which is the last required Professional Core Course.

Collaboration is an important component of teacher and school effectiveness because it is the key to unifying the people who work to promote quality educational experiences for the children and youth in eastern Kentucky.

2. Program Experiences

Central to the initial mathematics secondary teacher program is the inclusion of the following **Kentucky New Teachers Standards (NTS I-IX)** from the Kentucky Department of Education (1994 revised 2000):

- I. **Designs/Plans Instruction** -The teacher designs/plans instruction and learning climates that develop student abilities to use communication skills, apply core concepts, become self-sufficient individuals, become responsible team members, think and solve problems, and integrate knowledge.
- II. **Creates/Maintains Learning Climates** - The teacher creates a learning climate that supports the development of student abilities to use communication skills,

- apply core concepts, become self-sufficient individuals, become responsible team members, think and solve problems, and integrate knowledge.
- III. **Implements/Manages Instruction** - The teacher introduces/manages 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.
 - IV. **Assesses/Communicates Learning Results** - The teacher assesses learning and communicates results to students 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.
 - V. **Reflects/Evaluates Teaching/Learning** - The teacher reflects on and evaluates specific teaching/learning situations and/or programs.
 - VI. **Collaborates with Colleagues/Parents/Others** - The teacher collaborates 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, think and solve problems, and integrate knowledge.
 - VII. **Engages in Professional Development** - The teacher evaluates his/her overall performance with respect to modeling and teaching Kentucky's learning goals, refines the skills and processes necessary, and implements a professional development plan.
 - VIII. **Knowledge of Content** - The teacher demonstrates a current and sufficient academic knowledge of certified content areas to develop student knowledge and performance in those areas.
 - IX. **Demonstrates Implementation of Technology** - The teacher uses 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.

The following excerpts from MATH 402 and MATH 403 syllabi show integration of the Kentucky New Teacher Standards into the secondary mathematics program.

MATH 402: Integrated Biology, Mathematics, and Physical Science Teaching Methods

Student Expectations: Students in this course will be expected to:

1. develop methods in classroom management.
2. understand how to meet the KERA New Teachers Standards.
3. gain knowledge about taking the Praxis Exam for teachers.
4. learn how to select textbooks and software for their courses.
5. develop proper assessment tools and teaching strategies to meet these assessments.
6. understand how to budget and purchase supplies and teaching equipment.
7. learn how to develop lesson and unit plans.
8. present multiple teaching sessions to their class.
- 9.

MATH 403: Integrated Biology, Mathematics and Physical Sciences Field Experiences in Teaching

Diversity: This course deals with diversity both directly and indirectly, as discussions are included on learner differences (multiple intelligences, gifted

and special needs). There is a gender activity applied to the directed observation section of this course, and various topics deal with cultural differences in learning.

Use of Technology: Students will be expected to use the Internet and World Wide Web to communicate through email and perform web-based searches. Students will utilize PowerPoint presentations, VCR's, graphing calculators, electronic grade book and other software products.

Table 1 shows the relationship of mathematics courses in the initial secondary mathematics teacher education program to the Kentucky New Teacher Standards

Table 1: Relationship of Secondary Mathematics Content Courses to Kentucky New Teacher Standards (NTS)

Math Courses	NTS I	NTS II	NTS III	NTS IV	NTS V	NTS VI	NTS VII	NTS VIII	NTS IX
Math 170								X	X
Math 175								X	X
Math 275								X	X
Math 300								X	X
Math 301								X	X
Math 308								X	X
Math 350								X	X
Math 365								X	X
Math 370								X	X
Math 371								X	X
Math 402	X	X	X	X	X	X	X	X	X
Math 403	X	X	X	X	X	X	X	X	X
Math 499C								X	X

In Table 2: I = Introduction, the standard is present at a basic level
D = Developmental, standard is thoroughly implemented
S = Skill, standard is demonstrated proficiency

Table 2: Relationship of Professional Education Courses to NTS

Courses	NTS I	NTS II	NTS III	NTS IV	NTS V	NTS VI	NTS VII	NTS VIII	NTS IX
EDF 207	I	I			I	I			I
EDF 211		I		I					I
EDF 311	D	D	D	D	D	I	I		D
EDSP 332	I	I	D	I	I	I	I		I
EDSE 312	D	D	D	D	D	D	I		S
EDSE 333	D	D	D	I	I	I			D
EDSE 499c	D	D	D	D	D	I	D	S	S
EDSE 416	S	S	S	S	S	D	D	S	S

The initial secondary mathematics teacher education program includes specific mathematics content and mathematics pedagogical courses. These are included in Table 3 which is from the National Council of Teachers of Mathematics.

**OUTCOMES (NCTM)
MATHEMATICS IN INITIAL PROGRAMS FOR
9-12 MATHEMATICS TEACHERS**

A high school background of 4 years of mathematics, including the equivalent of precalculus, is assumed. The equivalent of a college major in mathematics should provide for the successful completion of the outcomes listed below (see Table 5).

Table 3 below contains the mathematics requirements, including the course number, title, and number of hours, for prospective teachers preparing to teach mathematics in grades 8 -12.

**Table 3: Mathematics Content Courses Required for the Initial
Secondary Mathematics Teacher Education Program**

	Course Number	Course Title	Number of Hours
1	MATH 170	Introduction to Algorithms	3
2	MATH 175	Analytic Geometry and Calculus I	4
3	MATH 275	Analytic Geometry and Calculus II	4
4	MATH 300	Introduction to Mathematical Proof	3
5	MATH 301 MATH 308	Elementary Linear Algebra, or Discrete Mathematics	3
6	MATH 350	Introduction to Higher Algebra	3
7	MATH 365	Introduction to Mathematical Statistics	3
8	MATH 370	College Geometry I	3
9	MATH 371	College Geometry II	3
10	MATH 499C	Senior Capstone	3

Table 4 shows a listing of the mathematics methods requirements, including the course number and title, for teacher candidates preparing to teach mathematics in grades 9-12.

**Table 4: Mathematics Methods Course Requirements for Initial
Secondary Teacher Education Program**

	Course Number	Course Title	Hours
1	MATH 402	BIO/MATH/SCI 402. Biology, Mathematics, Physical Sciences Teaching Methods.	3
2	MATH 403	BIO/MATH/SCI 403. Integrated Biology, Mathematics and Physical Sciences Field and Experiences in Teaching.	3

The National Council of Teachers of Mathematics has designated Problem Solving, Reasoning, Communication, and Connections as four overriding themes that should permeate an initial mathematics programs for teacher education candidates at the secondary level.

Included below are statements about the four NCTM Themes as they relate to the initial secondary mathematics teacher education program at MSU.

- **Problem Solving:** The following narrative illustrates how the requirements of the initial mathematics education program provide opportunities for candidates to mature in their problem-solving abilities. *Student problem solving abilities are enhanced by the use of regular homework assignments, comprehensive final and chapter or section examinations, by collaborating in small group activities and out of-class projects, and by the effective application of graphing calculators and computer technology. As an example, students in MATH 175 and 275 regularly model real work situations by using appropriate calculus/algebra technology based procedures.*
- **Reasoning:** The following narrative illustrates how the requirements of the initial secondary mathematics education program provides opportunities for Morehead State University mathematics education candidates to make and evaluate mathematical conjectures and arguments, and to validate their own mathematical thinking. *Making conjectures with the use of exploratory learning and instruction combine to allow the students to validate their thinking. An example of this would be Math 170, Introduction to Algorithms. In this course the student is expected to recognize environments where it is important to not only know which algorithm would apply to a mathematical problem but to also be expected to understand the efficiency of the algorithm as well as the general properties of related algorithms. The algorithms are illustrated and studied by using the computer language Python.*
- **Communication:** The following narrative illustrates how candidates in mathematics education at MSU use both oral and written discourse between teacher and candidate and among candidates to development and extent their mathematical understanding. *In MATH 499C, Senior Capstone, the students must research a mathematically related topic and make a 45-60 minute presentation to the class. Additionally the student must write a paper on their findings and submit it to the instructor as part of the course evaluation. Departmental faculty members are asked to attend the presentation and to pose questions to the student presenters. Additionally many faculty allow for students to present their homework problems in their classes, or to have small group presentation in their classes.*
- **Connections:** The following narrative illustrates how candidates in mathematic education at MSU have opportunities to demonstrate their understanding of mathematical relationships across disciplines and connections within mathematics. *In Math 175 Analytic Geometry and Calculus I, students are frequently asked to model real life situations from the areas of physics, chemistry, the social sciences, etc. As an example, in the course Math 402, Integration of Biology, Mathematics, and Physical Sciences Teaching Methods, opportunities are provided for students from the three areas to collaborate and discuss topics that cut across all three of the represented disciplines in an integrated format.*

The NCTM Table 5 lists the mathematics content and pedagogical courses for 9-12 Outcomes.

Table 5: Mathematics Content and Pedagogical Courses for NCTM 9-12 Outcomes.

9-12 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 300
1.5.2 apply numerical computation and estimation techniques and extend them to algebraic expressions;	MATH 175, 275, 370, 371
1.5.3 apply the process of measurement to two-and three-dimensional objects using customary and metric units;	MATH 370, 371
1.5.4 use geometric concepts and relationships to describe and model mathematical ideas and real-world constructs;	MATH 370, 371
1.5.5 understand the major concepts of Euclidean and other geometries;	MATH 370, 371
1.5.6 use both descriptive and inferential statistics to analyze data, make predictions, and make decisions;	MATH 365
1.5.7 understand the concepts of random variable, distribution functions, and theoretical versus simulated probability and apply them to real-world situations;	MATH 365
1.5.8 use algebra to describe patterns, relations, and functions, and to model and solve problems;	MATH 175
1.5.9 understand the role of axiomatic systems and proofs in different branches of mathematics, such as algebra and geometry;	MATH 300
1.5.10 have a firm conceptual grasp of limit, continuity, differentiation and integration, and a thorough background in the techniques and application of calculus;	MATH 175, 275

9-12 Outcomes	Evidence: performance data, experiences, courses
1.5.11 have a knowledge of the concepts and applications of graph theory, recurrence relations, linear programming, difference equations, matrices, and combinatorics;	MATH 308, 365
1.5.12 use mathematical modeling to solve problems from fields such as natural sciences, social sciences, business, and engineering;	MATH 175, 275
1.5.13 understand and apply the concepts of linear algebra;	MATH 301
1.5.14 understand and apply the major concepts of abstract algebra;	MATH 350

Integrated Essential Outcomes

Essential outcomes related to teaching diverse learners, utilization of technology, and the alignment of assessment and instructional practices within the mathematics program designed to prepare teachers of mathematics are integrated in MATH 402, MATH 403, and MATH 499C. Outcomes are also demonstrated during clinical experiences and the professional semester. These outcomes are described in course syllabi at the MSU NCATE Web site: <http://msucoe.org/syllabispring.html>

Outcomes are documented in a variety of ways: 1) performance and reflection on the design and implementation of lesson plans, 2) documented observation of teaching episodes by instructors and supervising teachers during clinical and field experiences, 3) in a portfolio during the professional semester; 4) performance on the PRAXIS content and pedagogical examinations.

The NCTM performance outcomes for secondary (9-12) mathematics education are incorporated in specific courses. The relationship of outcomes to courses taken by prospective mathematics teachers is described in Table 6.

Table 6: NCTM Outcome Matrix

9-12 Outcomes	Evidence: performance data, experiences, courses
2.4 Programs prepare prospective teachers who can identify, teach, and model problem solving in grades 9-12.	MATH 175, 275, 300, 301, 308, 499C
2.5 Programs prepare prospective teachers who use a variety of physical and visual materials for exploration and development of	MATH 402, 403

9-12 Outcomes	Evidence: performance data, experiences, courses
mathematical concepts in grades 9-12.	
2.6 Programs prepare prospective teachers who use a variety of print and electronic resources.	MATH 499C
2.7 Programs prepare prospective 9-12 teachers who know when and how to use student groupings such as collaborative groups, cooperative learning, and peer teaching.	MATH 402, 403
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, 403
2.9 Programs prepare prospective teachers who can work on an interdisciplinary team and in an interdisciplinary environment.	MATH 175, 275, 300, 402, 499C
2.10 Programs introduce and involve prospective teachers in the professional community of mathematics educators.	MATH 402
FIELD-BASED EXPERIENCES	
3.1 Programs provide prospective teachers with a sequence of planned opportunities prior to student teaching to observe and participate in 9-12 mathematics classrooms with qualified teachers. Experiences include observing, tutoring, mini-teaching, and planning mathematics activities and lessons for different mathematics courses.	MATH 403
3.2 Programs provide prospective teachers with a full-time student teaching experience in 9-12 mathematics that is supervised by a qualified teacher and a university or college supervisor with a 9-12 mathematics teaching experience.	MATH 403
3.3 Programs provide prospective teachers with time to confer with the supervising teacher and to do instructional planning.	MATH 403

The relationship between the KY Education Reform Act (KERA) and the courses in the secondary mathematics-teaching program are illustrated in Table 7 and 8.

Table 7: KERA Initiatives and Links to Professional Education Coursework

COURSES	Learner Goals and Academic Expectations	Program of Studies P-12	Core Content for Assessment
EDF 207	X		
EDF 211			
EDF 311	X	X	X
EDSP 332	X	X	X
EDSE 312	X	X	X
EDSE 333	X	X	X
EDSE 499C	X	X	X
EDSE 416	X	X	X

Table 8: KERA Initiatives and Relationship to Mathematics Courses

Courses	Learner Goals and Academic Expectations	Program of Studies P-12	Core Content for Assessment
Math 402	X	X	X
Math 403	X	X	X
Math 499C	X	X	X

Although the KERA Initiatives are not explicitly taught in the mathematics content courses, candidates will develop a knowledge and skill base that will enhance their preparation for becoming effective teachers.

Clinical and Field Experiences

Clinical and field experiences will be designed to provide candidates with an opportunity to develop knowledge, skills, and dispositions consistent with the units standards and the New Teacher Standards and to demonstrate these in a classroom or through the completion of a variety of written assignments. The intention is to provide a candidate with the opportunity to observe, analyze and practice a variety of teaching/learning techniques and to be able to locate and use essential professional resources: 1) Learner Goals and Academic Expectations, 2) the appropriate Program of Studies, and 3) Core Content for Assessment. Specific assignments have been designed by the faculty who deliver the courses in this program to ensure that students are engaged in developmentally appropriate ways as they move through the four tiered field experience structure. Field placements occur in a minimum two of the three educational levels. Self-reflection will be integrated throughout all aspects of the clinical and field experiences so that students extend their ability to make more informed decisions and select and use effective teaching practices.

Student teaching is the exit clinical experience and Kentucky Teachers Internship Program (KTIP) standards will frame the student performance expectations.

A department affiliated University Supervisor will work closely with a Cooperating Teacher in a public school to ensure that each candidate is progressing at an acceptable rate and level; using observation, dialogue and written assessment and portfolio artifacts as the means for student evaluation.

**Table 9: Mathematics Teaching 8 - 12 Program: Field and Clinical Experiences
By Levels I - IV**

Level	Courses	Field Hours Required	Expected Experiences	Actual Hours
I	EDF 207	16	General Observation: Diversity and Exceptionality School Board Meeting or site based council	12 2 2
I	EDF 211	16	Diversity Exceptionality	4 12
I	EDF 311	16	Support Roles Management, Grading, etc. Individual tutoring	12 4
		48 req.		48 total
II	EDSE 312	43	Observations: General Technology skill development	10 33
II	EDSP 332	10	Observations: Exceptionality One on One	10 5
II	Math 402	15	Small group teaching Whole group Assessment	10 5 5
		68 req.		78 total
III	Math 403	52	Content area guided observations Large group and whole class teaching Small group content teaching Participation One on one	5 24 12 8 8
		52 req.		57 total
IV	Student Teaching	241	Observation Teaching Participation	40 135 30 36
		241 req.		241 total

3. NCATE Themes

NCATE Themes are integrated into the professional Education Core as illustrated in Table 10.

Table 10: NCATE Themes & Relationship to Professional Education Courses

NCATE Themes	Conceptual Framework	Diversity	Intellectual Vitality	Technology	Professional Community	Evaluation	Performance Assessment
EDF 207	I	I	I	I	I		I
EDF 211	I	D	I	I	I	I	I
EDF 311	D	D	D	D	D	D	D
EDSP 332	D	D	I	I	D	I	D

EDSE 312	D	D	D	S	I	I	D
EDSE 333	D	D	S	D	I	D	D
EDSE 499c	S				D	D	D
EDSE 416	S	S	S	S	S	S	S

NCATE Themes are integrated into mathematics courses Math 402, 403, and 499C as illustrated in Table 11.

Table 11: NCATE Themes Integrated into Pedagogy-Based Mathematics Courses

COURSES	Diversity	Technology	Professional Community	Evaluation	Performance Assessment	Intellectual Integrity	Conceptual Framework
MATH 402	X	X	X	X	X	X	X
MATH 403	X	X	X	X	X	X	X
MATH 499C		X				X	X

Numerous experiences related to NCATE themes are provided for candidates enrolled in the secondary mathematics teacher education program. Some of these experiences are described in Table 12 for each of the seven NCATE themes of diversity, technology, professional community, evaluation, performance assessment, intellectual integrity and the constructivist-based conceptual framework.

Table 12: NCATE Themes Integrated Through the Mathematics Methods Courses.

<p>Diversity: In Math 402 and Math 403 candidates adapt lesson plans and units to meet the needs of individual learners; candidates discuss different kinds of learners; candidates are introduced to theorists who describe different kinds of learners, i.e., Howard Gardner; candidates develop tutoring techniques; candidates learn what to look for in individual student performance; candidates complete a three hour course on working with exceptional students.</p>
<p>Technology: Candidates are linked to numerous mathematics-related Web sites for both content and pedagogical purposes; candidates utilize software and hardware to design lessons and units, i.e., Microsoft Office for multimedia presentations, VCR's, graphing calculators, grade book and specialized software products; candidates design lessons to involve students in the use of technology for learning; presentations are video taped.</p>
<p>Evaluation: Candidates' teaching performance is evaluated multiple times based on <i>KNTS</i>; reflection journals and discussions are utilized by candidates to think about their own teaching.</p>

Performance Assessment: Candidates are assessed based on their performance during numerous teaching presentations in class with peers, during tutoring sessions and in the field with secondary level students; candidates are expected to incorporate performance assessment into lessons and units they design; candidates are expected to demonstrate classroom management skills; candidates learn about and utilize a variety of assessment approaches.

Intellectual Integrity: Instruction in MATH 402, 403 and MATH 499C is based on NCTM Standards <http://ncate.org/standard/programstds.htm#nctm>. Candidates utilize the *Core Content for Assessment* in secondary mathematics and the *Program of Studies* for Mathematics at the secondary level. Evaluation of candidates' performances is based on Beginning (Initial) *Kentucky New Teacher Standards*. The texts selected for the courses provide essential and appropriate information about teaching mathematics at the secondary level.

Conceptual Framework: Instructional strategies and methods modeled and utilized in MATH 402 and MATH 403 demonstrate a constructivist philosophical base by instructors engaging learners in design and implementations of multiple lesson plans; candidates reflect orally and in writing after each teaching episode; expectations describe the candidates as "developing" competence; video tapes of presentations are self-critiqued by candidates.

4. Assessment

A. Assessment of the Candidate

1. Teacher Education Program Admission Criteria

- a. Successful completion of 45 semester hours
- b. Minimum GPA of 2.5 (documented by official transcript)
- c. Three recommendations, at least two from university faculty, citing students disposition for teaching
- d. Minimum of 21 on ACT with minimum subtest scores of 10, or ACT of 18 with minimum subtest scores of 10 and PPSI scores of 173 Reading, 172 Math, or Computer Format reading 320, writing, 318, math 318, or 1200 GRE, or SAT 990.
- e. Successful completion EDF 207, EDF 211, PSY 154 (Min. "C"), SPCH 108
- f. Proficiency on oral and written communication: ENG 100 and ENG 200 (Minimum grade of "C" in each)

- g. Demonstrate moral, ethical and social behavior commensurate with the standards of the school community at large.
- h. Successful completion of Departmental Admissions Interview Committee.
- i. Transfer students who were recently admitted to a teacher education program may provide evidence of admission in lieu of interview provided they are applying for admission to the same program/major. Transfer students must fulfill all program requirements listed above.
- j. All students applying to the TEP must sign a declaration affirming: 1) a commitment to upholding the Professional Code of Ethics for Kentucky, 2) knowledge of the TEP Handbook, 3) requirements for certification, and 4) no felony convictions.

2. On-Going Candidate Assessment

Candidates will be monitored each semester by their advisor. The following will be reviewed and weighed when evaluating a candidate's progress:

- a. General Education Course Completion
- b. GPA status throughout the entire program
- c. Successful completion of TEP admission prerequisites
- d. Timely application for consideration for admission to TEP
- e. Progress completing professional education and program course requirements
- f. Fulfillment of PRAXIS Test requirements prior to student teaching and follow-up

3. Program Exit Requirements

Students must:

- a. Maintain a GPA of at least 2.5 (Official Transcript)
- b. Successfully complete the supervised teaching courses/experience (Observation evaluations by university supervisor and cooperating teacher and school principal)
- c. Successfully complete the exit portfolio requirements (A minimum of 2 program faculty will evaluate portfolio documents in conjunction with New Teacher Standards and appropriate performance expectations)
- d. Successfully complete the PRAXIS (Tests 10061 and 10063) content area tests and the PLT Examinations: Secondary mathematics candidates must achieve a passing score of 141 on both of the PRAXIS II Specialty Exams in Mathematics.
- e. Successfully complete disposition evaluations

A copy of the Undergraduate Transition Points Document is presented in Table 13 to illustrate the organization of candidate assessment.

Table 13: Undergraduate Transition Points Document

Transition Point	Assessment Data	Decision Maker(s)	Outcome
1) Admission to TEP	<ul style="list-style-type: none"> • ACT, PPST, or GRE Score(s) • Writing Sample Score • Recommendation Forms Initial Dispositions • Overall GPA (2.5) • Successful completion ENG 100, 200, PSY 154, CMAP 1018, EDF 207, and EDF 211 • Department Interview Results 	<ul style="list-style-type: none"> • Teacher Education Council 	<ul style="list-style-type: none"> • Department/Program Committee recommends students for admission to Program. • Director of Educational Service Unit compiles lists from each program and presents whole list to Teacher Education Council • Teacher Education Council approves or does not approve recommendation made and students informed in writing of admission recommendation
2) Prior to Student Teaching	<ul style="list-style-type: none"> • GPA (2.5), in all areas • Completion of Required Coursework • Completion of required PRAXIS Exam(s) 	<ul style="list-style-type: none"> • Director of Educational Services Unit (DESU) 	<ul style="list-style-type: none"> • Eligible or not eligible for Enrollment in Student Teaching and Placement in Public School (Candidates informed in writing, by DESU. When ineligible, deficiencies described in writing)
3) Student Teaching Evaluation	<ul style="list-style-type: none"> • KTIP or Other Observation Feedback • Portfolio documents which address each New Teacher Standard 	<ul style="list-style-type: none"> • MSU Supervisor • Cooperating Teacher 	<ul style="list-style-type: none"> • Successful completion of Student Teaching and Capstone
4) Program Completion	<ul style="list-style-type: none"> • Fulfilled all program requirements Transcript • Fulfilled all certification eligibility requirements 	<ul style="list-style-type: none"> • Office of the Registrar • Certification Officer (ESU) tracks and recommends to state • State 	<ul style="list-style-type: none"> • Eligible for graduation, diploma, informed in writing if ineligible for graduation. • Notified, in writing, (at last meeting of 499c classes) of any deficiencies that need to be handled to be recommended for certification. • Letter of eligibility stating certification area(s)

Program Evaluation

Essential to the success of this program is the ability to prepare and educate teachers who are ready to meet the actual day-to-day challenges of teaching mathematics at the secondary level in Kentucky schools. In addition to traditional measures such as interviews with graduates and superintendents, this program consistently and systematically seeks input from the field. All cooperating teachers with student teachers or field experience students assigned to them are asked to complete an observation evaluation instrument. Additionally dispositions for teaching are assessed in Math 402 and 403 and during the student teaching semester. A form is used that asks the experienced teachers to gauge the degree to which our students and student teachers demonstrate adequate preparation in crucial areas of teacher knowledge and skill. Use of

this form and traditional feedback mechanisms such as conferences and video observations and critiques allow faculty to quickly identify areas of program weaknesses and take corrective action.

The 2001-2002 Departmental Assessment Report for the Department of Mathematical Sciences can be found in Appendix A

5. Professional Education Faculty

Table 14 Professional Education Faculty from the Department of Mathematical Sciences

NAME	Highest Degree	Area of Specialization	Responsibilities in the Program	Full-time MSU Full-time Program	Full-time MSU Part-time Program	Part-time MSU Part-time Program
Kris Cebulla Thompson	M.S. in Mathematics; M.A. in Curriculum; Ph.D. Math Education	Secondary Mathematics Education (statistics)	Teaches Math 231/232 and Math 330		X	
Gerd Fricke	Ph.D.	Mathematics	Teaches Math 231/232		X	
Dora Ahmadi	Ph.D.	Mathematics Education	Teaches Math 131, 332, 330, 175, 275		X	
Doug Chatham	Ph. D.	Mathematics	Teaches Math 353, 332		X	
Vivian Cyrus	Ph.D.	Mathematics	Teaches Math 175, 300, 231, 232		X	
Rodger Hammons	Ph.D.	Mathematics	Teaches Math 174, 175		X	
Lloyd Jaisingh	Ph.D.	Statistics	Teaches Math 354, 123, 365		X	
Kathy Lewis	Ph.D.	Mathematics	Teaches Math 131, 174, 300, 301		X	
Russell May	Ph.D.	Mathematics	Teaches Math 170, 152		X	
Gordon Nolen	M.A.	Mathematics	Teaches Math 370			X
Ted Pack	A.M.E.D.	Education	Teaches Math 091, 093		X	
Randy Ross	M.A.	Mathematics	Teaches Math 174, 301		X	
Chris Schroeder	Ph.D.	Mathematics	Teaches Math 152, 275		X	
Dan Seth	Ph.D.	Mathematics	Teaches Math 152, 399E		X	
Joyce Saxon	M.A.	Mathematics	Teaches Math 231/232, 330, 332			X
Johnnie Fryman	Ed.D.	Mathematics Education	Teaches Math 231, 232, 330			X
Charlie Jones	M.A.	Mathematics Education	Teaches Math 402/403			X

Table 15: Secondary Professional Education Core Course Faculty

Secondary Professional Education Core Course Faculty

Faculty NAME	Highest Degree	Area of Specialization	Professional Core Program Responsibilities	Full time MSU Full-time Program	Full-time MSU – Part-time Program	Part-time MSU – Part-Time Program
Karen Hammons	MA	Curriculum	EDF 207	ERSE		
Paul McGhee	Ph.D.	Educational Administration	EDF 207		ERSE/ LSE	
Anna Pennell	Ph.D.	Critical Theory	EDF 207	ERSE		
Wayne Willis	Ph.D.	Foundations of Education	EDF 207		ERSE	
Lola Aagaard-Boram	Ph.D.	Foundations of Education	EDF 211	LSE		
Beverly Klecker	Ph.D.	Educational Psychology	EDF 311	LSE		
Ron Skidmore	Ph.D.	Educational Psychology	EDF 211 EDF 311	LSE		
Lesia Lennex	Ed.D	Educational Technology	EDSE 312	LSE		
Edith Lombardo	Ed.D	Special Education	EDSE 332	ERSE		
Timothy Thomas	Ph.D.	Curriculum Instruction	EDSE 333	LSE		
			EDSE 499c			
			EDSE 416			

* Teaching assignments for EDSE 499c, The Teacher in Today's School and EDSE 416, Student Teaching are program specific.

6. Curriculum Contract/Guide Sheet

MOREHEAD STATE UNIVERSITY

Guide Sheet:

Initial Secondary (8-12) Mathematics Teacher Education

Program - Bachelor of Science

Student's Name _____ Student I.D. _____ Date _____

1. General Education

(A) Required Core

- (1) Writing I (100 level) _____
ENG 100 Writing I
- (2) Oral Communications (100 level) _____
CMSP 108 Fundamentals of Speech Communication
- (3) Math Reasoning (100 level) _____
Choice of one of seven approved courses
- (4) Computer Competence (100 level) _____
Choice of one out of eight approved courses
- (5) Writing 2 (200 level) _____
ENG 200 - Writing II

15 hrs required (____)

(B) Area Studies Courses

- (1) Humanities - 9 hours _____
Choice of three from a list of 25 approved courses
- (2) Natural and Mathematical Sciences - 9 hours _____
Choice of three from a list of 18 approved courses
- (3) Social and Behavioral Sciences - 6 hours _____
PSY 154 Introduction to Psychology
Choice of two from a list of 16 other approved courses
- (4) Practical Living _____
Choice of one from a list of nine approved courses

30 hrs. required (____)

(C) Integrative Capstone Course

- MATH 499C Mathematics Capstone _____
3 hrs required (____)

2. Academic/Content Studies With Course Descriptions

- MATH 170 Introduction to Algorithms _____
A first course in the numerical treatment of algorithms using the generic language of pseudocode.
- MATH 175 Analytic Geometry and Calculus I (4) _____
Functions and graphs; limits; continuity; integration; applications of the derivative; integration; applications of integration
- MATH 275 Analytic Geometry and Calculus II (4) _____
Differentiation and integration of exponential, logarithmic, and trigonometric functions; techniques of integration; numerical methods; improper integrals; infinite series
- MATH 300 Introduction to Mathematical Proof _____
Propositional calculus; sets; relations; functions; Boolean Algebras; cardinality, mathematical proofs

MATH 301	Elementary Linear Algebra or Vectors spaces; determinants; matrices; linear transformations; eigenvectors	
MATH 308	Discrete Mathematics A course in algorithms, counting principles, recurrence relations, generating functions, graphs, trees, networks	_____
MATH 350	Introduction to Higher Algebra Groups, rings, integral domains, related topics	_____
MATH 365	Introduction to Mathematical Statistics A calculus based introduction to probability and statistics.	_____
MATH 370	College Geometry I Sets of axioms, finite geometries, convexity, Euclidean geometry of the polygon and circle, geometric constructions	_____
MATH 371	College Geometry II Geometric transformations, non-Euclidean geometry, projective geometry, geometric topology, geometry of inversion	_____
MATH 499C	Senior Capstone Designed to give the student an introduction to research and literature in mathematics.	_____

Note: In addition to the above, the Department of Mathematical Sciences strongly recommends that secondary teaching majors complete MATH 276 Analytic Geometry and Calculus III (4 hrs.) and both MATH 301 Linear Algebra and Math 308 Discrete Mathematics

3. Professional Studies

(To be admitted to the Teacher Education Program a student must have a minimum G.P.A. of 2.5 on all course work on the transcript.)

EDF 207	Foundations of Education
EDF 211	Human Growth and Development
EDF 311	Learning Theories in the Classroom
EDSP 332	Teaching the Exceptional Student (2 hours)
EDSE 312	Teaching Skills and Media

4. Pedagogical Studies

MATH 402	Integrated Biology, Mathematics, and Physical Science Teaching Methods
MATH 403	Integrated Biology, Mathematics, Physical Sciences Field Experiences in Teaching

5. Integrative Studies

EDSE 416	Student Teaching (12 hours)
EDSE 499C	Teacher in Today's Schools (2 hours)

Department Exit Requirements

Portfolios: Contains documents demonstrating level of candidate proficiency In relation to each New Teacher Standard.

PRAXIS Exam Requirements

The Mathematics Content Area and the Secondary PLT must be completed prior to student teaching.

Student's Name _____ Date Check Sheet Processed _____
Second Major or Minor _____ Advisors Name _____

Student's Signature _____ Date _____

Appendix A

**ANNUAL ASSESSMENT RECORD
FOR
Mathematical Sciences**

2001-2002
(Assessment Period Covered)

October 9, 2002
(Date Submitted)

Includes Assessment Reports for those Instructional Programs listed below:

- Mathematics Bachelors
- Mathematics & Computing/Computer Science Bachelors

Expanded Statement of Institutional Purpose Linkage:

Institutional Mission Reference:

Morehead State University shall serve as a comprehensive regional university providing high-quality instruction at the undergraduate and master's levels.

College/University Goal(s) Supported:

To provide quality educational programs in the Mathematical Sciences to meet the needs of the Morehead State University students and to the twenty-two county service region.

Intended Educational (Student) Outcomes:

1. Students completing the program will be able to demonstrate an understanding of mathematical concepts.

2. Students completing the program will be able to communicate mathematical ideas.

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ANNUAL ASSESSMENT REPORT

for

Mathematics
(Instructional Degree Program)

Bachelor
(Degree Level)

2001-2002
(Assessment Period Covered)

October 9, 2002
(Date Submitted)

Intended Educational (Student) Outcome:

1 Students completing the program will be able to demonstrate an understanding of mathematical concepts.

First Means of Assessment for Outcome Identified Above:

1 a. Means of Program Assessment & Criteria for Success:
Students will take the Major Field Area Test (MFAT) in mathematics as part of the Capstone course Math 499C requirements. The class mean score will be at or above the 50th percentile.

1 a. Summary of Assessment Data Collected:
The mean score on the MFAT was 69.125%, well above the 50th percentile. The criterion was met. The range of individual percentage scores was 41% - 97%. However, two student scores fell below the 50th percentile that is of concern to the department.

1 a. Use of Results to Improve Instructional Program:
This criterion has been met. Monitoring of this criterion will continue since two of the students were below the 50th percentile.

Second Means of Assessment for Outcome Identified Above:

1 b. Means of Program Assessment & Criteria for Success:
As a part of the Capstone course Math 499C, students will be assigned a research project to demonstrate their mathematical knowledge and their ability to communicate this knowledge. Under the guidance of an advisor each student will conduct a research project, write a paper, and give an in-class presentation. A team of faculty will assess the student's ability to understand and communicate mathematics. The components on the evaluations that relate to "understanding" will have a mean at or above 70%.

1 b. Summary of Assessment Data Collected:
The mean of student understanding of mathematics on the Capstone project was 84.5%. This average

is above the goal of 70%. Criterion was met.

1 b. Use of Results to Improve Instructional Program:

This criterion has been met. Monitoring will continue. The goal may need to be raised if the mean remains 10% or more above the goal of 70%.

ANNUAL ASSESSMENT REPORT

for

Mathematics

(Instructional Degree Program)

Bachelor

(Degree Level)

2001-2002

(Assessment Period Covered)

October 9, 2002

(Date Submitted)

Intended Educational (Student) Outcome:

2 Students completing the program will be able to communicate mathematical ideas.

First Means of Assessment for Outcome Identified Above:

2 a. Means of Program Assessment & Criteria for Success:

As a part of the Capstone Course, students will be assigned a research project to demonstrate their mathematical knowledge and their ability to communicate this knowledge. Each student with the guidance of an advisor will conduct research, write a paper, and give a presentation. Students will be assessed by a team of evaluators on their ability to demonstrate an understanding of mathematics and their ability to communicate mathematical ideas. The components on the evaluations that relate to ability to "communicate" mathematical ideas will have a mean at or above 70%.

2 a. Summary of Assessment Data Collected:

The mean student rating by the team of evaluators on student ability to communicate mathematical ideas on the Capstone project was 88.75%. This is above the goal of 70%. The criterion was met.

2 a. Use of Results to Improve Instructional Program:

The criterion has been met. Monitoring will continue. The goal may need to be raised if students continue to perform 10% or more above 70%.

ANNAUL ASSESSMENT REPORT

for

Mathematics and Computing/Computer Science

(Instructional Degree Program)

Bachelor

(Degree Level)

2001-2002

(Assessment Period Covered)

October 9, 2002

(Date Submitted)

Expanded Statement of Institutional Purpose Linkage:

Institutional Mission Reference:

Morehead State University shall serve as a comprehensive regional university providing high-quality instruction at the undergraduate and master's levels.

College/University Goal(s) Supported:

To provide quality educational programs in the Mathematical Sciences to meet the needs of the Morehead State University students and to the twenty-two county service region.

Intended Educational (Student) Outcomes:

1. Students completing the program will be able to demonstrate an understanding of mathematics and/or computer science.

2. Students completing the program will be able to communicate mathematics and/or computer science ideas and techniques.

ASSESSMENT REPORT

for

Mathematics and Computing/Computer Science
(Instructional Degree Program)

Bachelor
(Degree Level)

2001-2002
(Assessment Period Covered)

October 9, 2002
(Date Submitted)

Intended Educational (Student) Outcome:

1 Students completing the program will be able to demonstrate an understanding of mathematics and/or computer science.

First Means of Assessment for Outcome Identified Above:

1 a. Means of Program Assessment & Criteria for Success:
Students will take the Major Field Area Test (MFAT) covering mathematics or computer science as part of the Capstone course requirements. The mean of student scores will be at or near the 50th percentile.

1 a. Summary of Assessment Data Collected:
The class mean score was 50.2%, slightly above the 50th percentile. The range of individual student scores was 12%-80%.

1 a. Use of Results to Improve Instructional Program:
This criterion has been met. Monitoring will continue since two individual scores fell below the 50th percentile.

Second Means of Assessment for Outcome Identified Above:

1 b. Means of Program Assessment & Criteria for Success:
As a part of the Capstone Course, students will be assigned a research project to demonstrate their mathematical and/or computer science knowledge and their ability to communicate this knowledge. Each student with the guidance of an advisor will conduct research, write a paper, and give a presentation. Students will be assessed by a team of evaluators on their ability to demonstrate an understanding of mathematics and/or computer science and their ability to communicate mathematical and/or computer science ideas and techniques. The components on the evaluations that relate to ability to demonstrate an "understanding" of mathematics and/or computer science will have a mean at or above 70%.

1 b. Summary of Assessment Data Collected:
The mean student rating by the team of evaluators on student understanding of mathematical and/or

computer science concepts on the Capstone project was 92.6%. This is above the goal of 70%. The criterion was met.

1 b. Use of Results to Improve Instructional Program:

The criterion was met. Monitoring will continue. The goal may need to be raised if the mean continues to be 10% or more above 70%.

ASSESSMENT REPORT

for

Mathematics and Computing/Computer Science
(Instructional Degree Program)

Bachelor
(Degree Level)

2001-2002
(Assessment Period Covered)

October 9, 2002
(Date Submitted)

Intended Educational (Student) Outcome:

2 Students completing the program will be able to communicate mathematics and/or computer science ideas and techniques.

First Means of Assessment for Outcome Identified Above:

2 a. Means of Program Assessment & Criteria for Success:

As a part of the Capstone Course, students will be assigned a research project to demonstrate their mathematical and/or computer science knowledge and their ability to communicate this knowledge. Each student with the guidance of an advisor will conduct research, write a paper, and give a presentation. Students will be assessed by a team of evaluators on their ability to demonstrate an understanding of mathematics and their ability to communicate mathematical and/or computer science ideas and techniques. The components on the evaluations that relate to ability to communicate mathematical and/or computer science ideas and techniques will have a mean at or above 70%.

2 a. Summary of Assessment Data Collected:

The mean student ratings by the team of evaluators on student ability to communicate mathematical and/or computer science ideas and techniques on the Capstone project was 88.5%. This is above the goal of 70%. The criterion was met.

2 a. Use of Results to Improve Instructional Program:

The criterion was met. Monitoring will continue. The goal may need to be raised if the mean continues to be 10% or more above 70%.

