MURRAY STATE UNIVERSITY

College of Education and Human Services

MATHEMATICS EDUCATION (GRADES 8-12)
BACHELORS OF SCIENCE/BACHELORS OF ARTS
PROGRAM SUBMISSION
SEPTEMBER 2015

PGM Code: 37 and Certification

The content courses in this program are used for determining the equivalent of a major or area, addressing and assessing SPA and Kentucky Academic Standards through a transcript review for entrance into our Alternative Certification Option 6 Program. PGM Code: 1841

Executive Summary

Theme of the Unit

The mission of the College of Education and Human Services is the preparation of leaders for successful careers that positively impact communities as advocates and practitioners, through student-centered, authentic, and engaging academic programs. The college envisions being recognized for producing graduates who foster excellence in their communities. The college's education programs support that mission and vision by ensuring candidates exemplify the knowledge, skills, dispositions, leadership qualities, and decision-making skills necessary to serve as effective educators in their communities. The goal of the college's educator preparation program is to produce candidates who demonstrate the characteristics of a Murray State University graduate, the proficiencies delineated by Kentucky Teacher Standards and the knowledge required by learned societies. "Educator as a reflective decision-maker" is the unit's theme. Undergraduate candidates demonstrate professional dispositions throughout their course work, field experiences, and student teaching. Murray State University candidates will become educators who demonstrate these dispositions: inclusive, responsible, enthusiastic, caring, confident, and ethical. Graduate candidates exhibit the same dispositions while developing their capacities as teacher leaders who foster excellence in their classrooms, schools, districts, and communities.

Unique Features

Murray State University (MSU) has long recognized teacher preparation as a major institutional focus. Established in 1922 by the Kentucky General Assembly as Murray State Normal School, the institution was renamed Murray State College in 1948 and achieved university status in 1966 as Murray State University. This tax-supported residential comprehensive university is composed of the Hutson School of Agriculture, School of Nursing and Health Professions, and four academic colleges: College of Education and Human Services, Arthur J. Bauernfeind College of Business, College of Humanities and Fine Arts, and Jesse D. Jones College of Science, Engineering and Technology. The university fosters an exciting and challenging learning environment by emphasizing student-centered learning and educational experiences; preparing graduates to succeed in a culturally diverse, technologically oriented society; developing collaborative relationships with alumni and community constituents; promoting international education; and encouraging academic outreach.

MSU serves an 18-county region in the heart of the Jackson Purchase area of Western Kentucky. In fall 2015, the university's enrollment was 10,614 students. MSU has the highest graduation rate (53.1%) and the highest retention rate (72.4%) of among public comprehensive universities in the Commonwealth. Murray State University has consistently been ranked among the top Southern regional and liberal arts colleges in the *U.S. News & World Report's* annual publication, *America's Best Colleges* and has been listed in Kiplinger's *100 Best Values in Public Colleges*. Senior Surveys indicate that

students are positive about their overall education as well as their chosen major in teacher education at Murray State. The Southern Association of Colleges and Schools (SACS) has continuously accredited Murray State since 1928.

Until July 2014, the College of Education departments were: Adolescent, Career and Special Education; Early Childhood and Elementary Education; and Educational Studies, Leadership and Counseling. During a summer 2014 university-wide academic reconfiguration, the College of Education transformed into the College of Education and Human Services (COEHS). The three existing departments were joined by the Department of Community Leadership and Human Services and the Center for Communication Disorders. Please reference the COEHS organizational flowchart at http://coekate.murraystate.edu/ncate/st/general.htm.

COEHS is a member of the American Association of Colleges for Teacher Education (AACTE), Teacher Education Council of State Colleges and Universities (TESCU) and is accredited by the National Council for the Accreditation of Teacher Education (NCATE). Initial accreditation from NCATE was received in 1954. Murray State University has actively pursued and maintained NCATE accreditation for its teacher preparation program. In fall 2016, the unit will seek Council for the Accreditation of Educator Preparation (CAEP) accreditation.

Several unit programs are provided at these Kentucky extended regional campuses: Henderson, Hopkinsville, Madisonville, and Paducah. Candidates can earn undergraduate degrees in elementary education, middle school education, learning and behavior disorders, and interdisciplinary early childhood education. Each semester, the unit hosts an extended campus team session to share unit initiatives, provide professional development, and host course instructional team meetings. All instructors teaching the same course at all sites meet to create a common vision for their course, design common course assignments and assessments, and discuss ways to ensure a consistent, quality course delivery at all site locations.

Rationale for the Program
According to the U.S. Department of Labor, job prospects are best for teachers in high-demand fields, such as mathematics, sciences, languages, and bilingual education. Locations in urban or rural school districts are also considered to be high need areas for content area teachers. Teachers who are geographically mobile and who obtain licensure in more than one subject are likely to have a distinct advantage in finding a job. The Secondary Education program includes University Studies courses, professional education courses and subject-matter content majors or areas. Students can choose from three certification levels: grades 8-12, grades 5-12, and grades P-12. These programs will prepare students in the specified grade ranges in curriculum content areas. The programs range from approximately 120 credit hours to 130 credit hours in content areas as well as professional education coursework. The programs provide access to current best practices and research through practicum experiences and field-based learning activities. The culminating experience is a semester-long teaching experience in the appropriate

content area in a public school. Students in these programs are assigned dual advisors: a faculty member in the subject-matter department and one in the Department of Adolescent, Career and Special Education.

Admission and Exit Requirements
Continuous assessment procedures are used to document and systematically monitor candidate progress throughout the education program to ascertain candidates' proficiency in the Kentucky Teacher Standards. Checkpoints provide data to facilitate faculty efforts to make recommendations for improvement, remediation, or candidates' continuance in the program. To become admitted to the teacher education program, candidates must meet the following requirements:

- Attend an admission to teacher education orientation.
- Pass all portions of the CASE exam.
- Earn an overall undergraduate GPA $\geq$ 2.75 on a 4.0 point scale.
- Complete a minimum of 24 credit hours with a GPA $\geq$ 2.75.
- Earn a "B" or higher in the following courses: ENG 105, MAT 117 (or higher), COM 161, EDU 103 (or equivalent).
- Receive their advisor's recommendation to continue in the program through the interview process.
- Review and declare they will adhere to the Professional Code of Ethics for Kentucky School Personnel.
- Submit an official application to Teacher Education Services.

To be admitted to student teaching, candidates must be admitted to teacher education and meet these requirements:

- Attend an admission to student teaching orientation.
- File a formal application with Teacher Education Services two semesters prior to the student teaching term.
- Demonstrate teaching ability in field and practicum experiences.
- Complete 200 hours of field experiences and legislated components.
- Maintain a GPA $\geq$ 2.75 in overall coursework, professional education coursework, and major or area(s).

To begin student teaching, candidates must have senior, post-bac, or graduate status and have completed all major courses and specialty areas. In addition, they must meet these requirements:

- Complete all required professional teacher education courses with GPA $\geq$ 2.75.
- Provide documentation of a current physical exam and a TB risk assessment.
- Obtain a criminal records check.
- Complete all PBIS modules.
- Supply TES with any required information.

To be recommended for initial certification, candidates must successfully complete student teaching and program requirements. They must earn passing scores on relevant *PRAXIS* specialty area tests and the *Principles of Learning and Teaching* exam. Because teacher certification requirements are subject to change, students who are registering for

the tests need to refer to the Education Professional Standards (EPSB) website at
www.kyepsb.net for current requirements.

Modes of Delivery

Course work is delivered through multiple venues: traditional (face-to-face), hybrid (part
traditional, part online), and online.

Conceptual Framework

All teacher certification programs at Murray State University share the same conceptual
framework. This document is available at
http://coehsnet.murraystate.edu/program_submissions/.

Continuous Assessment

All teacher certification programs at Murray State University share a continuous
assessment plan. This document is available at
http://coehsnet.murraystate.edu/program_submissions/.

Program Experiences

A. Courses and Experiences

The Mathematics Education program supports the unit's theme by nurturing individuals
to become reflective decision-makers. Reflection is the focus of course activities and is
the primary means by which candidates integrate course experiences with Kentucky
performance Standards (KTS), College of Education and Human Services Dispositions,
and the candidates' own experiences, values, and beliefs about education. At the
program's beginning, candidates are asked to reflect upon their own values and beliefs
about education and seek integration of those with the COEHS Dispositions through
assignments such as philosophy statements, growth plans, practicum work, and other
reflective assignments. This process continues as candidates develop portfolio items to
reflect their growth and understanding of educational principles leading to the program's
end with the eligibility portfolio as a summative evaluation of their knowledge and
demonstration of their skills according to Kentucky performance standards. Throughout,
program coursework is designed to require planning and reflecting at increasing levels of
expertise. Secondary education program faculty collaborate with content area faculty to
teach concepts, principles, theories, standards, and research related to evidence-based
practices in secondary curriculum, and assessment. The pedagogy coursework models the
use of active instructional methods, real-life applications, and cognitive strategies to
stimulate learning and provide motivation for the secondary learner. Along with a strong
component of content knowledge in the areas of certification, the program is designed to
integrate theory into practice with field experiences scheduled as an integral part of
methods courses. As program policy, candidates follow curriculum guidesheets and

RACR audits (a university advising program tool), and confer with advisors to help them to monitor their personal progress and prepare them for the continuous self-assessment required of professional educators.

At admission to teacher education, candidates are interviewed by faculty and asked to respond to the COEHS dispositions and the Kentucky Code of Ethics. The *Professional Code of Ethics for Kentucky School Personnel* is presented at three additional times to candidates - during orientations to teacher education and student teaching and during the student teaching interview. The Kentucky teacher performance standards are integrated throughout core courses and secondary methods courses as demonstrated in the table below. Candidates are introduced to the standards in early coursework where they gain knowledge (K) of the role performance standards play in becoming reflective decision-makers. As coursework progresses, the standards are applied (A) in lesson plans and other instructional activities. At the end of the program, during extended practicum and student teaching, candidates are evaluated (E) for each standard in an eligibility portfolio. The portfolio is independently scored by two faculty members with content and instructional knowledge in the discipline. In addition, the Murray program allows for post-baccalaureate students to return and earn certification in a content area.

The primary goal of the Mathematics Education program is to equip preservice teachers with tools for developing a deep conceptual knowledge of mathematical concepts through attention to critical thinking and problem solving. Although they have seen most of the mathematics covered in high school before, they probably have had little experience thinking about it from a teacher's perspective. They have also often had few opportunities to truly think deeply about the material. Therefore, they need to develop an understanding that is rich enough to allow them to teach their future students in a meaningful and effective way. As a result, preservice teachers are required to go beyond applying a set of rules to produce an answer and are asked to explain the concepts involved and to justify why things work.

Code of Ethics

Teacher candidates read and examine the *Professional Code of Ethics for Kentucky School Personnel* when they attend an admission to teacher education orientation. They sign the *Declaration of Eligibility* to attest they (1) understand the standard for personal and professional conduct expected of a professional educator; (2) certify they have read, examined, and understand the *Professional Code of Ethics for Kentucky Certified School Personnel* and agree to abide by its terms during the course of preparation and careers as professional educators; and (3) affirm and declare that all information they give is true, correct, and complete to the best of their knowledge. This is one of the requirements for admission to teacher education.

Once the *Declaration of Eligibility* has been completed and signed, if the attestation changes during the time of participation in the teacher education program the Director of Teacher Education Services must be notified immediately and a new declaration must be submitted. Teacher candidates re-examine the *Professional Code of Ethics for Kentucky*

School Personnel during the admission to student teaching orientation. They submit an updated *Declaration of Eligibility* at the conclusion of this orientation. Once candidates have completed all program and certification requirements, they submit a CA-1 application for Kentucky Certification. The application includes a section entitled *Character and Fitness.* By signing the form, candidates attest they have abided and will continue to adhere to the *Professional Code of Ethics for Kentucky School Personnel.*

Teaching Reading and Writing Skills

Candidates enhance their personal literacy skills by successfully completing two *Oral and Written Communication* university studies courses, ENG 105 *Critical Reading, Writing, and Inquiry* and COM 161 *Introduction to Public Speaking*. Furthermore, they complete additional hours of Historical, Literary, and Philosophical university studies courses based upon their choice of content. Students further refine their writing skills by completing the unit's writing-intensive student teaching semester. Methods courses with included field experiences provide students with hands on planning, teaching, and tutoring instruction with secondary level public school students. If the student chooses an English content area, they complete 24 credit hours in literature, English, and writing. Furthermore, candidates demonstrate writing proficiency by passing the writing portion of the *Core Academic Skills for Educators* exam. The Praxis II examination in their content area is required for certification for students completing the degree. Candidates are trained to integrate content area literacy throughout their instructional delivery during the SEC 420 and SEC 422 practicum experiences.

Field Experiences

As per 16 KAR 5:040 legislation, Kentucky teacher candidates are required to complete a minimum of 200 clock hours of field experiences prior to student teaching. Candidates participate in varied activities in P12 school settings. Activities include engaging a diverse student population, observing in schools and related agencies (e.g. Family Resource Centers or Youth Service Centers), tutoring, interacting with families of students, attending school board and school-based council meetings, participating in a school-based professional learning community, and assisting teachers or other school professionals. Candidates record field experience hours and activities on the *LiveText Field Experience Module* system and the *Kentucky Field Experience Tracking System.* Course instructors, cooperating teachers, and university supervisors confirm candidates' participation. The unit provides training, video clips, and step-by-step directions to facilitate candidates', instructors' and cooperating teachers' recording efforts. Most practicum hours are completed during SEC 420 and SEC 422. Field experience audit sheets describe field/clinical experience activities. See http://www.murraystate.edu/academics/CollegesDepartments/CollegeOfEducatio nandHumanServices/TeacherEducationServices/componentauditsheets.aspx.

Secondary Education Field Experiences Table

Course	Field Hours
EDU 103	7 hours
EDP 260	7 hours
EDU 303	6 hours
EDU 403	3 hours
EDU 405	2 hours
SED 300	7 hours
SEC 420	57 hours
SEC 422	118 hours

EPSB Themes

Effective educators need to be equipped with the knowledge, skills, dispositions, and decision-making skills necessary to address the needs of a diverse student population. Therefore, the Kentucky Education Professional Standards Board has identified four important themes (diversity, assessment, literacy, closing the achievement gap) to be integrated throughout candidates' academic course work. Furthermore, the unit's theme of *Educator as a Reflective Decision-Maker* is emphasized throughout candidates' program preparation. The *EPSB Themes for Mathematics Core Education Courses* table depicts the degree to which these themes are addressed in multiple courses.

EPSB Themes for Mathematics Core Education Courses

Course	EPSB THEMES				UNIT THEME
	Diversity	Assessment	Literacy	Gap	Reflective Decision-Maker
EDP 260	A				A
EDU 103	A	K		A	E
EDU 303	K	K	K	K	A
EDU 403	A	A		A	A
ELE 421	E	E	E	E	E
SEC 420	E	E	K	K	E
SED 300	K	K	K	K	A
K – Knowledge, A – Application, E – Evaluation					

Mathematics Education Content Course Descriptions

MAT100T Transitions (1). Course is designed to assist students in their transition to Murray State University. Content includes orientation to the specific area or major(s) and minor(s) within the academic program; university procedures, policies, and resources; strategies for personal and academic success, and extra curricular opportunities. Only one transitions course will count towards graduation. Required of all entering freshmen. Graded pass/fail.

MAT 250 Calculus and Analytic Geometry I (5). First course in calculus develops main ideas of differentiation and integration of single-variable functions. Topics include limits, continuity, techniques of differentiation, graphing techniques, definite and indefinite integral, basic integration methods, and applications of the derivative and integral to natural and social sciences. Prerequisites: ACT math standard score of at least 26 or MAT 150 or MAT 140/145.

MAT 308 Calculus and Analytic Geometry II (5). A continuation of MAT 250, this course further develops techniques and applications of integration and is an introduction to sequences and series. Topics include integration strategies, computing areas and volumes, arc length, parametric curves, polar coordinates, sequences and series, tests for convergence of series, power series, and Taylor series. Prerequisite: MAT 250.

MAT 309 Calculus and Analytic Geometry III (4). Course develops main ideas of differentiation and integration of functions of several variables and introduces vector calculus. Topics include vectors, analytic geometry of 3-dimensional space, functions of several variables, partial derivatives, directional derivatives, integrals of functions of two and three variables, vector fields, line integrals, Green's theorem, and the divergence theorem. Prerequisite: MAT 308.

MAT 312 Mathematical Reasoning (3). Course designed to improve the students' understanding of the nature and methods of mathematical proof by means of practice and participation. The content will include mathematical logic, set theory, relations and functions, cardinality, axiomatic structures, techniques of proof, and extensive practice in proof and problem solving. Credit cannot be received for both MAT 312 and 399. The department recommends a student take this course in his/her sophomore year in the program. Prerequisite: MAT 308 or consent of instructor.

MAT 335 Matrix Theory and Linear Algebra (3). The algebra of matrices and its application to problems in Euclidean spaces and elementary linear transformations. Prerequisite: MAT 308.

MAT 421 Introductions to Algebraic Structures (3). An elementary study of the major structures in modern algebra including groups, rings, fields and integral domains. Prerequisite: MAT 308 and 312.

MAT 442 Introduction to Numerical Analysis (3). Taylor polynomial approximation, numerical root finding methods and fixed-point iteration, polynomial and spline interpolation, numerical differentiation and integration, and direct methods for the solutions of linear systems. Prerequisite: MAT 308 or consent of instructor.

MAT 506 Mathematical Modeling I (3). A study of mathematical models used in the social, life and management sciences and their role in explaining and predicting real world phenomena. The

emphasis is on developing skills of model building. Topics include difference equations, perturbation theory and non-dimensional analysis. Prerequisite: MAT 388.

MAT 513 Modern Algebra I (3). An in-depth study of groups. Topics will include permutation groups, cyclic groups, cosets and factor groups, subgroups and normal groups, and the Isomorphism Theorems. Some introductory discussions of rings and fields will be included as well. Prerequisite: MAT 308 and 312.

MAT 516 Introduction to Topology (3). Set theory, topology of the real line, topological spaces, metric spaces. Prerequisite: MAT 309 and 312.

MAT 517 Foundations of Geometry (3). Study of postulate systems for geometry, critical examination of Euclid's Elements, introduction to non-Euclidean geometry. Prerequisite: MAT 309 or consent of instructor.

MAT 524 Boundary Value Problems (3). Analytic and computational techniques for linear first and second order partial differential equations, initial, and boundary value problems. Classification, Fourier series, separation of variables, finite difference and/or finite element methods. Prerequisites: MAT 309, 335 or consent of instructor, and 388.

MAT 525 Advanced Calculus I (3). A rigorous development of one variable calculus including limits, continuity, differentiation, integration and sequences of functions. Prerequisite: MAT 309 and 312.

MAT 540 Mathematical Statistics I (4). Introduction to probability theory and statistical inference. Combinatorics, conditional probability independence. Discrete and continuous random variables and their distributions. Expected value and moments of distributions. Estimation theory and properties point estimators. Confidence intervals. Basic theory of hypothesis testing. Testing means and proportion. T-tests. Descriptive statistics. Prerequisite: MAT 309 or consent of instructor.

MAT 541 Mathematical Statistics II (3). Additional topics in probability theory and statistical inference. Bayes' Theorem, functions of random variables, order statistics. Bayesian inference, F-tests, chi-square tests, contingency tables, regression and correlation. Prerequisites: MAT 540.

MAT 550 Teaching Mathematics (3). A study of the "whys" of mathematics with the aim of equipping future/current teachers with the ability to explain rather than merely do mathematics. Taught in the context of theories of learning and pedagogy. Involves mathematics content taught at the secondary and community college level. Credit granted toward an undergraduate major or minor in mathematics only for those students following a teacher certification program. Prerequisite: MAT 312 or consent of instructor.

Modes of Delivery

Secondary education courses are delivered on the Murray State University campus using face-to-face and online delivery methods. Many instructors also use a blend of approaches, or hybrid model of delivery. Faculty use web-based learning platforms such as *Canvas* and *LiveText* to supplement and enhance face-to-face instruction.

Modes of Delivery for Program Content Courses

Course Number	Face to Face	Web	On-Campus
EDU 103	X	X	X
EDU 303	X		X
EDU 403	X		X
EDU 405	X		X
SEC 420	X		**Practicum Sites**
SEC 422	X		**Practicum Sites**
SEC 421	X		**Student Teaching Sites**
EDP 260	X	X	X
SED 300	X		X

B. Specialty Professional Association (SPA) Standards

The NCTM standards are integrated throughout core courses and methods courses as demonstrated in the tables below with attention to several objectives across multiple courses. Course work is designed to require planning, instruction, assessing and reflecting at increasing levels of expertise.

NCTM - National Council Teachers of Mathematics Standards – Secondary

A.1. Number and Quantity To be prepared to develop student mathematical proficiency, all secondary mathematics teachers should know the following topics related to number and quantity with their content understanding and mathematical practices supported by appropriate technology and varied representational tools, including concrete models:	**Courses/ Activities/ Assessments**
A.1.1 Structure, properties, relationships, operations, and representations including standard and non-standard algorithms, of numbers and number systems including integer, rational,	All courses particularly MAT 513 and MAT 550 through instruction, assessment and activities

irrational, real, and complex numbers	
A.1.2 Fundamental ideas of number theory (divisors, factors and factorization, primes, composite numbers, greatest common factor, least common multiple, and modular arithmetic)	MAT 550 through instruction, assessment and activities
A.1.3 Quantitative reasoning and relationships that include ratio, rate, and proportion and the use of units in problem situations	All courses, particularly MAT250 and MAT550 through instruction, assessment and activities
A.1.4 Vector and matrix operations, modeling, and applications	MAT335 and MAT309 through instruction, assessment and activities
A.1.5 Historical development and perspectives of number, number systems, and quantity including contributions of significant figures and diverse cultures	MAT550 through instruction

A.2. Algebra To be prepared to develop student mathematical proficiency, all secondary mathematics teachers should know the following topics related to algebra with their content understanding and mathematical practices supported by appropriate technology and varied representational tools, including concrete models:	**Courses/ Activities/ Assessments**
A.2.1 Algebraic notation, symbols, expressions, equations, inequalities, and proportional relationships, and their use in describing, interpreting, modeling, generalizing, and justifying relationships and operations	All courses, particularly MAT250 MAT308 MAT309 MAT550 through instruction, activities and assessment
A.2.2 Function classes including polynomial, exponential and logarithmic, absolute value, rational, trigonometric, including those with discrete domains (e.g., sequences), and how the choices of	All courses, particularly MAT250 MAT308 MAT309 MAT550 MAT551 through instruction, assessment and activities

parameters determine particular cases and model specific situations	
A.2.3 Functional representations (tables, graphs, equations, descriptions, recursive definitions, and finite differences), characteristics (e.g., zeros, intervals of increase or decrease, extrema, average rates of change, domain and range, and end behavior), and notations as a means to describe, reason, interpret, and analyze relationships and to build new functions	MAT250 MAT308 MAT309 MAT312 MAT551 through instruction activities and assessment
A.2.4 Patterns of change in linear, quadratic, polynomial, and exponential functions and in proportional and inversely proportional relationships and types of real-world relationships these functions can model	MAT250 MAT308 MAT309 MAT551 through instruction, assessment and activities
A.2.5 Linear algebra including vectors, matrices, and transformations	MAT335 through instruction assessment and activities
A.2.6 Abstract algebra, including groups, rings, and fields, and the relationship between these structures and formal structures for number systems and numerical and symbolic calculations	MAT513 through instruction, assessment, and activities
A.2.7 Historical development and perspectives of algebra including contributions of significant figures and diverse cultures	MAT513 MAT551 through instruction

A.3. Geometry and Trigonometry To be prepared to develop student mathematical proficiency, all secondary mathematics teachers should know the following topics related to geometry and trigonometry with their content understanding and mathematical practices supported by appropriate technology and varied	**Courses/ Activities/ Assessments**

representational tools, including concrete models:	
A.3.1 Core concepts and principles of Euclidean in two and three dimensions and two-dimensional non-Euclidean geometries	MAT517 through instruction, assessment and activities
A.3.2 Transformations including dilations, translations, rotations, reflections, glide reflections; compositions of transformations; and the expression of symmetry in terms of transformations	None
A.3.3 Congruence, similarity and scaling, and their development and expression in terms of transformations	None
A.3.4 Right triangles and trigonometry	MAT250 MAT308 MAT517 through instruction activities and assessment
A.3.5 Application of periodic phenomena and trigonometric identities	MAT250 MAT308 MAT517 through instruction activities and assessment
A.3.6 Identification, classification into categories, visualization, and representation of two- and three-dimensional objects (triangles, quadrilaterals, regular polygons, prisms, pyramids, cones, cylinders, and spheres)	MAT250 MAT308 MAT309 MAT517 through instruction, assessment and activates
A.3.7 Formula rationale and derivation (perimeter, area, surface area, and volume) of two- and three-dimensional objects (triangles, quadrilaterals, regular polygons, rectangular prisms, pyramids, cones, cylinders, and spheres), with attention to units, unit comparison, and the iteration, additivity, and invariance related to measurements	MAT250 MAT308 MAT309 through instruction, activities and assessment
A.3.8 Geometric constructions, axiomatic reasoning, and proof	MAT517 through instruction, activities and assessment
A.3.9 Analytic and coordinate geometry including algebraic proofs (e.g., the Pythagorean Theorem and its converse) and equations of lines and planes, and expressing	MAT517 through instruction, activities and assessment

geometric properties of conic sections with equations	
A.3.10 Historical development and perspectives of geometry and trigonometry including contributions of significant figures and diverse cultures	MAT517 through instruction

A.4. Statistics and Probability To be prepared to develop student mathematical proficiency, all secondary mathematics teachers should know the following topics related to statistics and probability with their content understanding and mathematical practices supported by appropriate technology and varied representational tools, including concrete models:	**Courses/ Activities/ Assessments**
A.4.1 Statistical variability and its sources and the role of randomness in statistical inference	MAT540 MAT541 through instruction activities and assessment
A.4.2 Creation and implementation of surveys and investigations using sampling methods and statistical designs, statistical inference (estimation of population parameters and hypotheses testing), justification of conclusions, and generalization of results	MAT540 MAT541 through instruction activities and assessment
A.4.3 Univariate and bivariate data distributions for categorical data and for discrete and continuous random variables, including representations, construction and interpretation of graphical displays (e.g., box plots, histograms, cumulative frequency plots, scatter plots), summary measures, and comparisons of distributions	MAT540 MAT541 through instruction activities and assessment
A.4.4 Empirical and theoretical probability (discrete, continuous,	MAT540 MAT541 through instruction activities and assessment

and conditional) for both simple and compound events	
A.4.5 Random (chance) phenomena, simulations, and probability distributions and their application as models of real phenomena and to decision making	MAT540 MAT541 through instruction activities and assessment
A.4.6 Historical development and perspectives of statistics and probability including contributions of significant figures and diverse cultures	MAT540 MAT541 through instruction

A.5. Calculus To be prepared to develop student mathematical proficiency, all secondary mathematics teachers should know the following topics related to calculus with their content understanding and mathematical practices supported by appropriate technology and varied representational tools, including concrete models:	Courses/ Activities/ Assessments
A.5.1 Limits, continuity, rates of change, the Fundamental Theorem of Calculus, and the meanings and techniques of differentiation and integration	MAT250 MAT308 MAT309 MAT525 MAT442 through activities instruction and assessment
A.5.2 Parametric, polar, and vector functions	MAT308 MAT309 through instruction activities and assessment
A.5.3 Sequences and series	MAT308 MAT525 through instruction activities and assessment
A.5.4 Multivariate functions	MAT309 MAT526 through instruction activities and assessment
A.5.5 Applications of function, geometry, and trigonometry concepts to solve problems involving calculus	MAT250 MAT308 MAT309 MAT525 MAT526 through instruction activities and assessment
A.5.6 Historical development and perspectives of calculus including contributions of significant figures and diverse cultures	MAT250 MAT308 MAT309 MAT525 MAT526 through instruction and activities

A.6. Discrete Mathematics To be prepared to develop student mathematical proficiency, all secondary mathematics teachers should know the following topics related to discrete mathematics with their content understanding and mathematical practices supported by appropriate technology and varied representational tools, including concrete models:	Courses/ Activities/ Assessments
A.6.1 Discrete structures including sets, relations, functions, graphs, trees, and networks	MAT312 MAT516 through instruction activities and assessment
A.6.2 Enumeration including permutations, combinations, iteration, recursion, and finite differences	MAT540 MAT541 through instruction activities and assessment
A.6.3 Propositional and predicate logic	MAT312 through instruction activities and assessment
A.6.4 Applications of discrete structures such as modeling and solving linear programming problems and designing data structures	MAT335 MAT442 through instruction activities and assessment
A.6.5 Historical development and perspectives of discrete mathematics including contributions of significant figures and diverse cultures	MAT312 through instruction

C. Kentucky Teacher Standards

The Kentucky Teacher Performance Standards are integrated throughout core courses and secondary education methods courses as demonstrated in the table below. Candidates are introduced to the standards in early coursework where they gain knowledge (K) of the role performance standards play in becoming reflective decision-makers. As coursework progresses, the standards are applied (A) in lesson plans and other instructional activities. At the end of the program, during student teaching, candidates are evaluated (E) for each standard in an eligibility portfolio. The portfolio is independently scored by two faculty members with content and instructional skill in the appropriate content area. Instructors use web-based learning platforms such as *Canvas* to supplement and enhance face-to-face instruction. The *Kentucky Teacher Standards* matrix demonstrates the integration of Kentucky Teacher Standards throughout secondary education coursework.

The Kentucky Teacher Standards and met through our coursework, and instruction. The mathematics courses' goals focus on several of these standards. Standard 1 which

requires students' have deep, applicable content knowledge, Standard 6 requiring the ability to utilize and understand mathematical uses of technology, Standard 7 with requires students to reflect on learning, and Standard 8 which requires collaboration with others – these are all attended to through the mathematics content courses that are required of the pre-service secondary teachers. Candidates' content knowledge (KTS 1) is developed in multiple mathematics courses such as *MAT 250, MAT 312, and MAT 510 and evaluated by a PRAXIS exam.

Kentucky Teacher Standards

Course	KTS 1	KTS 2	KTS 3	KTS 4	KTS 5	KTS 6	KTS 7	KTS 8	KTS 9	KTS10
CSC 199	K					A				
EDP 260		K	K	A		A	A	A		
EDU 103	A	K	A	K	K	K	A	K	K	K
EDU 303		A*	A	A	A	A	A	A	K	
EDU 403	A	K	A	K	K	K	A	K	K	A
EDU 405		A		A	E		A			
SEC 420	K	A	K	A					K	
SEC 422	E*	E*	E*	E*	E*	E*	E*	E*	E*	E*
SED 300	A	K	K			K	K	A	K	
MAT 550	E	A	A	A	K	A	A	A	K	A
SEC 421	E	E	E	E	E	E	E	E	E	E
K – Knowledge, A – Application, E – Evaluation, * - Signature Assignment										

- KTS 1: Content Knowledge
- KTS 2: Design Instruction
- KTS 3: Learning Climate
- KTS 4: Implements Instruction
- KTS 5: Assessment

- KTS 6: Technology
- KTS 7: Reflection
- KTS 8: Collaboration
- KTS 9: Professional Development
- KTS 10: Leadership

D. Kentucky Core Academic Standards

All teacher certification candidates in the Murray State University education program become familiar with the Kentucky Core Academic Standards (KCAS) in EDU 103 *Issues and Practices of American Education* or the equivalent course specific to their discipline. This course is designed to provide students with an overview of the field of education. The instructor of this course introduces the KCAS to raise candidates' initial awareness of KCAS as a framework for standards-based instruction. In EDU 303

Strategies of Teaching, the instructor spends several class sessions acquainting candidates with the KCAS. In this course, candidates develop lesson planning. All lesson plans, instructional, activities, and assessments must be aligned to the KCAS standards in the appropriate content area. Additionally, candidates take EDU 405 *Evaluation and Measurement in Education.* Candidates develop proficiency in designing standards-based assessment instruments and interpreting the results to inform future instruction. This course's key assessment provides an introduction to the Teacher Performance Assessment (TPA) candidates complete during their student teaching experience.

In the secondary education program, candidates apply what they have learned about designing KCAS standards-based instruction and assessment instruments during the field and practicum experiences associated with these professional education methods courses.

Kentucky Core Academic Standards

Course	KCAS Content Area	Activity
EDU 303	Specific to content area	Lesson plans, micro-teaching activities, mock classroom situations
SEC 420	Specific to content area	Lesson plans, unit plans, field experiences
SEC 422	Specific to content area	Lesson plans, unit plans, field experiences
SEC 421	Specific to content area	Student teaching experience -Designing and implementing instruction

During the student teaching semester, candidates complete TPAs which demonstrate their proficiency in designing, implementing, and reflecting upon KCAS-aligned instructional units, lessons, and assessment instruments. They draft a KCAS standards-based instructional unit. Candidates use the results from a pre-assessment to modify the unit by differentiating instruction to address students' academic needs. They teach and reflect upon a series of lessons before administering the post-assessment. Candidates analyze post-assessment data to discern student growth, continuing academic needs, and achievement gaps to inform future instruction.

E. Program Faculty

Mathematics Faculty

Name	Highest Degree, Field, & University	Assignment: Indicate the role(s) of the faculty member (1)	Faculty Rank (2)	Scholarship (3), Leadership in Professional Associations, and Service (4); List up to 3 major contributions in the past 3 years (5)*	Status (FT/PT to institution, unit, and program)
Edward Thome	Ph.D. Analysis Kansas State University	Department Chair and teaches math courses	Associate Professor	Mathematics Department Chair Supervisor of our region's Regional Coordinator for teacher development Assisted with the development of the state's KYOTE College Algebra and KYOTE Calculus Exams. Worked with some regional school districts on Dual-Credit courses and piloted a College Algebra plus CLEP testing model for one district which did not have staff necessary for dual-credit. Kept regional high schools aware of our M.A.T. offerings, KYOTE capabilities, and Mathematics career information and college prerequisites through a semesterly newsletter.	Full-time to Institution, Part-time to Unit, Part-time to Program
Rob Donnelly	Ph.D. Combinatorics Univeristy of North Carolina	Teaches mathematics courses	Professor		Full-time to Institution, Part-time to Unit, Part-time to Program
Gibson, David	Ed.D. Curriciulum Insruction Univesity of Kentucky	Teacher education liaison, Teaches mathematics and math methods courses	Associate Professor	Serves as education liaison for mathematics education *MSU Advisor of the Year*	Full-time to Institution, Part-time to Unit, Part-time to Program

Scott Lewis	Ph.D. Combinatorics University of Rhode Island	Teaches mathematics courses	Associate Professor		Full-time to Institution, Part-time to Unit, Part-time to Program
Maeve McCarthy	Ph. D. Differential Equations Rice University	Teaches mathematics courses	Professor	Maeve McCarthy, Howard Whiteman, *Intermorph cannibalism versus paedomorphosis in Arizona Tiger Salamanders, (Ambystoma tigrinum)*, International Journal of Biomathematics, to appear. K. Renee Fister, Maeve McCarthy, Seth Oppenheimer, Craig Collins, *Optimal control of insects through sterile insect release and habitat modification.*Mathematical Biosciences 2013 Aug; 244(2):201-12. doi: 10.1016/j.mbs.2013.05.008	Full-time to Institution, Part-time to Unit, Part-time to Program
Chris Mecklin	Ph.D. Statistics University of Northern Colorado	Teaches mathematics courses	Professor		Full-time to Institution, Part-time to Unit, Part-time to Program
Kelly Pearson	Ph.D. Algebraic Topology University of Oregon	Teaches mathematics courses	Professor		Full-time to Institution, Part-time to Unit, Part-time to Program
John Porter	Ph.D. Analysis Auburn University	Teaches mathematics courses	Professor	Monotone Properties Defined from Stars of Open Coverings, (with S. Popvassilev), Topology Appl. 169 (2014), 87–98. On Monotone Paracompactness, (with S. Popvassilev), Topology Appl. 167 (2014), 1–9.	Full-time to Institution, Part-time to Unit, Part-time to Program
David Roach	Ph.D. Approximation Theory	Teaches mathematics courses	Professor		Full-time to Institution,

	Vanderbilt University				Part-time to Unit, Part-time to Program
Omer Yayenie	Ph.D. Number Theory Temple Universtity	Teaches mathematics courses	Professor		Full-time to Institution, Part-time to Unit, Part-time to Program
Tan Zhang	Ph.D. Algebraic Topology Oregon University	Teaches mathematics courses	Professor		Full-time to Institution, Part-time to Unit, Part-time to Program
Donald Adongo	Ph.D. Numerical Analysis Kansas State University	Teaches Mathematics Courses	Associate Professor		Full-time to Institution, Part-time to Unit, Part-time to Program
Dubravko Ivansic	Ph.D. Topology University of Oklahoma	Teaches Mathematics Courses	Associate Professor		Full-time to Institution, Part-time to Unit, Part-time to Program
Manoj Pathak	Ph.D. Bayesian Method University of Nebraska-Lincoln	Teaches Mathematics Courses	Assistant Professor		Full-time to Institution, Part-time to Unit, Part-time to Program
Tim Schroeder	Ph.D. Group Theory University of Wisconsin-Milwaukee	Teaches Mathematics Courses, Graduate Coordinator	Associate Professor		Full-time to Institution, Part-time to Unit, Part-time to Program
Dustin Smith	Ph.D. K-12 Mathematics Education	Teaches mathematics and math methods courses,	Assistant Professor	Browning, C., & Smith, D. O. (2015). Serves as education liaison for math education @ MSU	Full-time to Institution, Part-time to Unit, Part-time to Program

	Western Michigan University	Teacher-Ed liaison			
Justin Taylor	Ph.D. Real Analysis, PDE University of Kentucky	Teaches mathematics courses	Assistant Professor	Heat Kernel for the Elliptic System of Linear Elasticity with Boundary Conditions, with Seick Kim and Russell Brown, Journal of Differential Equations, No. 7, 2485-2519, October 2014. The Green Function for Elliptic Systems in Two Dimensions, with Seick Kim and Russell Brown, Communications in Partial Differential Equations, , 1574-1600, August 2013. Convergence of Dirichlet Eigenvalues for Elliptic Systems on Perturbed Domains}, Journal of Spectral Theory, EMS, No. 3, 293-316, July 2013. The Mixed Problem in Lipschitz Domains with General Decompositions of the Boundary, with Katy Ott and Russell Brown, Transactions of the American Mathematical Society, AMS, 2895-2930, June 2013.	Full-time to Institution, Part-time to Unit, Part-time to Program
Elizabeth Donovan	Ph.D. Graph Theory Northeastern University	Teaches mathematics courses	Assistant Professor		Full-time to Institution, Part-time to Unit, Part-time to Program
Craig Collins	Ph.D. Differential Equations University of Tennesee	Teaches mathematics courses	Assistant Professor		Full-time to Institution, Part-time to Unit, Part-time to Program

Education Faculty

NAME	HIGHEST DEGREE, FIELD, & UNIVERSITY	ASSIGNMENT	FACULTY RANK	CERTIFICATIONS, EXPERIENCE, SCHOLARSHIP, LEADERSHIP IN PROFESSIONAL ASSOCIATIONS, AND SERVICE	STATUS
Brown, Cory	Ph.D, Multicultural and Equity Studies in Education, Ohio State University	Assistant Professor Teaches foundation courses	Assistant Professor	• *High School English – 2 years, Full-Time Academic Advisor, University of Cincinnati – 5 years, University Appointments, Education – 10 years.* • *Dixson, A. D., Dodo-Seriki, V. and Brown, C. T. (2014). Culturally relevant pedagogy at the intersections of race, gender, and class. Paper presented at the biennial meeting of the International Conference on Urban Education, Montego Bay, Jamaica.* • *Dodo-Seriki, V., Brown, C. T., and Fasching-Varner, K. (Accepted and in preparation, 2015). The permanence of racism in teacher education. In J. K. Donnor, R. Reynolds, M. Lynn, and A. D. Dixson (Eds.). Is the post-racial still racial?:Understanding the relationship between race and education. NSSE Yearbook, Teachers College Record.* • *National Council of Teachers for English Assembly of Research - Program Reviewer and Planning Committee, 2015 (New Orleans, Louisiana)*	Full-time to institution Part-time to unit Part-time to program
Campoy, Renee	Ed.D. Curriculum & Instruction University of Missouri-St. Louis	Assistant Dean (Part-time) Teaches EDU 405 (part-time) NCATE Coordinator	Professor	• Book: (2004) Case study analysis in the classroom • Presentation: (2006) AERA • BOE Team member: (2005-present)	Full-time to Institution, Full-time to Unit, Part-time to Program
Gierhart, Greg	MA, Education, Murray State University	Hart Residential College Head Teaches instructional strategies and math methods courses	Lecturer	• *Certifications & Experience: KY Teaching Lic., Middle school Spanish, Science, and Math, endorsement for teaching early elementary, DPP, School Administration.*	Full-time to institution Part-time to unit Part-time to program

				10 years experience – middle school. • *Murray Lion's Club, National Council of Teachers of Mathematics, National Science Teachers Association, Association of Supervisors and Curriculum Development, International Literacy Association, Association for Middle Level Education, Phi Delta Kappan, Phi Kappa Phi* • *KY Department of Education, Math & Science Leadership Networks*	
Matlock, Pam	MA Special Education, Murray State University	Paducah Campus 2+2 Education Coordinator Teaches special education courses	Lecturer	First Book, Chapter Advisor - Monthly distribution of new books to low socioeconomic students in public schools, KEA - SP, Chapter Advisor - Global Education Outreach Committee, Chairperson	Full-time to institution Part-time to unit Part-time to program
Stormer, Kimberly	Ph.D. Instructional Leadership Academic and Curriculum University of Oklahoma	Middle Level Education Program Coordinator, Teaches middle level education courses.	Assistant Professor	Taught for 7.5 years in large urban school district; and Worked as a School Improvement Specialist for the Oklahoma State Department of Education Diversity Chair Kentucky Council Teachers of English Advisor Murray State Middle Level Association	Full-time to institution Part-time to unit Part-time to program
Musselman, Meagan	Ph.D. Curriculum & Instruction Southern Illinois University	Teacher Leader Program Coordinator, Teaches middle level undergraduate education courses and graduate courses across multiple levels	Associate Professor	Taught math and science in public middle schools; and Education consultant to area schools President of Kentucky Association of Teacher Educators	Full-time to institution Part-time to unit Part-time to program

E. Curriculum Contracts/Guidesheets

Program coordinators ensure current guidesheets are available for advisors and students (http://coekate.murraystate.edu/coecms/ncate/manager/advsheet). Guidesheets are used by academic advisors, students, and faculty to ensure consistency and clarity of program requirements.

Murray State University
DEPT. OF MATHEMATICS AND STATISTICS
MATHEMATICS MAJOR/SECONDARY CERTIFICATION (GRADES 8-12)
Bachelor of Science/Bachelor of Arts Degree
CURRICULUM OUTLINE

	Enrolled	Semester Completed	Grade
MAT 100T Transitions	_____	_____	_____
MAT 250 Calculus I *	_____	_____	_____
MAT 308 Calculus II *	_____	_____	_____
MAT 309 Calculus III *	_____	_____	_____
MAT 312 Mathematical Reasoning	_____	_____	_____
MAT 335 Matrix Theory & Linear Algebra	_____	_____	_____
MAT 517 Foundations of Geometry	_____	_____	_____
MAT 540 Mathematical Statistics I	_____	_____	_____
MAT 550 Teaching Mathematics	_____	_____	_____

*Also satisfies University Studies Requirements

At least one course from each of the following two groups:
 (1)   MAT 513 Modern Algebra I, MAT 516 Introduction to Topology, and/or MAT 525 Advanced Calculus I.

MAT_____	_____	_____	_____

(2)   MAT 442 Numerical Analysis, MAT 501 Mathematical Modeling, MAT 524 Boundary Value   Problems, and/or MAT 541 Mathematical Statistics II.

MAT_____	_____	_____	_____

One 3 hour mathematics course numbered 400 and above.

MAT_____	_____	_____	_____

One course in Computer Science:

CSC 145	_____	_____	_____

REQUIRED FOR SECONDARY CERTIFICATION IN MATHEMATICS

	Enrolled	Semester completed	Grade
COM 161*	_____	_____	_____
PSY 180*	_____	_____	_____
HEA 191	_____	_____	_____
EDU 103*	_____	_____	_____
EDP 260*	_____	_____	_____
EDU 303	_____	_____	_____
COM 372	_____	_____	_____
SED 300	_____	_____	_____
EDU 403 Required one or two semesters prior to student teaching. SEC 420	_____	_____	_____
SEC 422	_____	_____	_____
EDU 405	_____	_____	_____
SEC 421 Student Teaching	_____	_____	_____

*Also satisfies University Studies Requirements.

Advisor's Signature _____ Date _____

Student's Signature _____ Date _____

REQUIREMENTS FOR ADMISSION TO TEACHER EDUCATION AND STUDENT TEACHING AT MURRAY STATE UNIVERSITY   Rev. (9/2015)

Teacher Education

To be admitted to teacher education, students must:

1. Attend an admission to teacher education orientation.
2. Earn passing scores on the Core Academic Skills for Educators (CASE) test with these subject scores – Reading 156, Writing 162, and Mathematics 150. Request

ETS to send scores to Teacher Education Services electronically by using this code, R1494. If any of the PPST subject areas were passed prior to September 1, 2014, use these PPST scores - Reading 176, Writing 174, and Math 174. GRE (Graduate Records Exam) scores may be used for Graduate Students only with a minimum passing score of 150 in verbal, 143 in quantitative, and 4.0 in analytical writing.

3. Earn an overall undergraduate GPA of > 2.75 on a 4.0 scale at the point of admission. This 2.75 minimum GPA remains a requirement throughout the teacher certification program.
4. Complete a minimum of 24 credit hours with a GPA > 2.75 to include the following coursework:
   a. ENG 101, 102, 104 or 105 with a "B" or higher
   b. MAT 117 (or higher level math) with a "B" or higher
   c. COM 161 or HON 165 with a "B" or higher
   d. EDU 103 with a "B" or higher (or AED 380 or EDU 104 or CTE 200 or MSU 123 or ELE 605 [graduate students])
5. Participate in the admission to teacher education interview and receive their academic
   advisor's recommendation to continue the program.
6. Review the Professional Code of Ethics for Kentucky School Personnel. Sign the
   a. Declaration of Eligibility (pink sheet) affirming a commitment to uphold the code and
   b. acknowledging awareness of information required for state certification. If answers given on the Declaration of Eligibility change during the time of participation in the teacher education program, the Director of Teacher Education Services must be notified immediately.

These requirements must be documented in *Recruiter*. CASE or GRE scores must be sent to MSU (R1494) via ETS. Admission will only be granted following a successful review by Teacher Education Services.

NOTE: Students who have not been admitted to Teacher Education will not be eligible to enroll in upper level courses that specify admission to teacher education as a prerequisite.

Student Teaching

To be admitted to student teaching, students must have
   1) been granted admission to Teacher Education;
   2) filed a formal application in Teacher Education Services two semesters prior to the term in which student teaching is desired (Applications are distributed at scheduled student teaching orientations only.);
   3) earned and maintained GPA > 2.75 in major/areas, professional education, and overall;
   4) demonstrated teaching ability in field and clinical situations;
   5) documented completion of 200 or more field hours and components (beginning 9/1/2013);
   6) senior, post-bac, or graduate status and have completed all major courses and specialty areas;
   7) been admitted to Teacher Education;

8) completed all required professional teacher education courses (EDU 103, EDP 260,

9) EDU 303, SED 300 and EDU 403, etc. – see specific requirements by major or area) with a GPA > 2.75 GPA;

10) filed a valid and current medical examination, which includes a TB risk assessment (to begin student teaching within six months of exam);

11) obtained a criminal records background check; and

12) supplied TES with any other required information (transcripts, course substitution forms, etc.).

General Requirements for Kentucky Certification

Graduates who wish to be recommended by MSU for an initial Kentucky teaching certificate must have

1) successfully completed an approved teacher education program including student teaching;

2) filed an application for certification (CA-1) with Teacher Education Services at MSU;

3) obtained at least minimal scores required on PRAXIS specialty area tests and the appropriate Principles of Learning and Teaching Test (PLT);

4) completed all applicable **computer literacy and applications** requirements;

5) earned a bachelor's degree;

6) mailed a copy of criminal record check to EPSB; and

7) sent official transcript to EPSB.

In addition, in Kentucky, full certification requires the completion of the Kentucky Teacher Internship Program. To be recommended for certification in other states, all Kentucky requirements must be met.

NOTE: Requirements for teacher certification are established by the Kentucky Education Professional Standards Board (KEPSB). Students are cautioned that changes in these requirements may occur after publication of the current Murray State University *Bulletin*. For the most current information, students should check with an advisor in one of the departments in the College of Education.

Teacher certification requirements are subject to change. Before registering for the test(s), please refer to the Education Professional Standards Board (EPSB) website at www.kyepsb.net for current requirements or contact Ms. Rice at 502-564-4606 or 888-598-7667.

Murray State University
DEPT. OF MATHEMATICS AND STATISTICS
MATHEMATICS/ SECONDARY CERTIFICATION **AREA** (GRADES 8-12)
Bachelor of Science/Bachelor of Arts Degree
CURRICULUM OUTLINE

	Enrolled	Semester Completed	Grade
MAT 099 Freshman Orientation	_____	_____	_____
MAT 250 Calculus I*	_____	_____	_____
MAT 308 Calculus II *	_____	_____	_____
MAT 309 Calculus III*	_____	_____	_____
MAT 312 Mathematical Reasoning	_____	_____	_____
MAT 335 Matrix Theory & Linear Algebra	_____	_____	_____
MAT 510 Foundations of Geometry	_____	_____	_____
MAT 540 Mathematical Statistics I	_____	_____	_____
MAT 550 Teaching Mathematics I	_____	_____	_____
MAT 551 Teaching Mathematics II	_____	_____	_____

*Also satisfies University Studies Requirements
(A)   Nine hours of math courses including:
       (1) At least one course from:

       MAT 421 Introduction to Algebraic Structures, MAT 505 Abstract Algebra I, MAT
              516 Topology I, and/or MAT 525 Advanced Calculus I.

       MAT_____   _____   _____   _____

       (2) At least one course from:
       MAT 442 Numerical Analysis, MAT 501 Mathematical Modeling, MAT 524
       Boundary Value Problems, and/or MAT 541 Mathematical Statistics II.

       MAT_____   _____   _____   _____

       (3) One 3 hour mathematics course numbered 400 or above.
       MAT_____   _____   _____   _____

(B)   One Course in Computer Science:

        CSC 145   _____   _____   _____   _____

(C) At least nine hours selected from MAT courses numbered 400 or above or from disciplines related to the application of mathematics. (See list below)

        1. _____   _____   _____   _____
        2. _____   _____   _____   _____
        3. _____   _____   _____   _____

Chemistry	**Economics**	**Computer Science**
CHE 201	**ECO 230**	**CSC 136**
CHE 202	**ECO 231**	**CSC 235**
CHE 305	**ECO 330**	**CSC 330**
CHE 403	**ECO 331**	**CSC 345**
CHE 410		**CSC 420**
		CSC 445
		CSC 515
		CSC 520

Physics	**Manufacturing/Mechanical**
PHY 235/236	**Engineering Technology**
PHY 240	**ENT 287**
PHY 255/256	**CET 298**
PHY 259	**ENT 400**
PHY 264	**IET 597**
PHY 330	
PHY 340	
PHY 359	**Civil Construction Engineering**
PHY 370	**ENT 382**
PHY 470	

REQUIRED FOR SECONDARY CERTIFICATION IN MATHEMATICS

	Enrolled	Semester completed	Grade
COM 161*	_____	_____	_____
PSY 180*	_____	_____	_____
HEA 191	_____	_____	_____
EDU 103*	_____	_____	_____
EDP 260*	_____	_____	_____
EDU 303	_____	_____	_____
COM 372	_____	_____	_____
SED 300	_____	_____	_____
EDU 403 Required one or two	_____	_____	_____
semesters prior to student teaching.			
SEC 420	_____	_____	_____
SEC 422	_____	_____	_____

EDU 405   _____   _____   _____
SEC 421 Student Teaching   _____   _____   _____

Advisor's Signature _____ Date _____

Student's Signature _____ Date _____

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- Earn an overall undergraduate GPA of > 2.75 on a 4.0 scale at the point of admission. This 2.75 minimum GPA remains a requirement throughout the teacher certification program.
- Complete a minimum of 24 credit hours with a GPA > 2.75 to include the following coursework:
    a. ENG 101, 102, 104 or 105 with a "B" or higher
    b. MAT 117 (or higher level math) with a "B" or higher
    c. COM 161 or HON 165 with a "B" or higher
    d. EDU 103 with a "B" or higher (or AED 380 or EDU 104 or CTE 200 or MSU 123 or ELE 605 [graduate students])
- Participate in the admission to teacher education interview and receive their academic
  advisor's recommendation to continue the program.
- Review the Professional Code of Ethics for Kentucky School Personnel. Sign the
    a. Declaration of Eligibility (pink sheet) affirming a commitment to uphold the code and
    b. acknowledging awareness of information required for state certification. If answers given on the Declaration of Eligibility change during the time of participation in the teacher education program, the Director of Teacher Education Services must be notified immediately.

These requirements must be documented in *Recruiter*. CASE or GRE scores must be sent to MSU (R1494) via ETS. Admission will only be granted following a successful review by Teacher Education Services.

NOTE: Students who have not been admitted to Teacher Education will not be eligible to enroll in upper level courses that specify admission to teacher education as a prerequisite.

Student Teaching

To **be admitted to student teaching**, students must have

- been granted admission to Teacher Education;
- filed a formal application in Teacher Education Services two semesters prior to the term in which student teaching is desired (Applications are distributed at scheduled student teaching orientations only.);
- earned and maintained GPA $\geq$ 2.75 in major/areas, professional education, and overall;
- demonstrated teaching ability in field and clinical situations;
- documented completion of 200 or more field hours and components (beginning 9/1/2013);
- senior, post-bac, or graduate status and have completed all major courses and specialty areas;
- been admitted to Teacher Education;
- completed all required professional teacher education courses (EDU 103, EDP 260,
- EDU 303, SED 300 and EDU 403, etc. – see specific requirements by major or area) with a GPA > 2.75 GPA;
- filed a valid and current medical examination, which includes a TB risk assessment (to begin student teaching within six months of exam);
- obtained a criminal records background check; and
- supplied TES with any other required information (transcripts, course substitution forms, etc.).

General Requirements for Kentucky Certification

Graduates who wish to be recommended by MSU for an initial Kentucky teaching certificate must have

- successfully completed an approved teacher education program including student teaching;
- filed an application for certification (CA-1) with Teacher Education Services at MSU;
- obtained at least minimal scores required on PRAXIS specialty area tests and the appropriate Principles of Learning and Teaching Test (PLT);
- completed all applicable **computer literacy and applications** requirements;
- earned a bachelor's degree;
- mailed a copy of criminal record check to EPSB; and
- sent official transcript to EPSB.

In addition, in Kentucky, full certification requires the completion of the Kentucky Teacher Internship Program. To be recommended for certification in other states, all Kentucky requirements must be met.

NOTE: Requirements for teacher certification are established by the Kentucky Education Professional Standards Board (KEPSB). Students are cautioned that

changes in these requirements may occur after publication of the current Murray State University *Bulletin*. For the most current information, students should check with an advisor in one of the departments in the College of Education.

Teacher certification requirements are subject to change. Before registering for the test(s), please refer to the Education Professional Standards Board (EPSB) website at www.kyepsb.net for current requirements or contact Ms. Rice at 502-564-4606 or 888-598-7667.

G. Syllabi

Common course syllabi, posted on the unit's intranet site, ensure all course instructors provide a consistent, quality delivery of each education course. These may be accessed at http://coekate.murraystate.edu/coecms/ncate/manager/syllabi/.

EDUCATION CORE AND METHODS COURSES
EDU 103
EDU 303
EDP 260
SED 300
EDU 403
EDU 405
SEC 420
SEC 422

Math Methods and Content Courses
MAT 299
MAT 250
MAT 550