Program Review Document

Preparation Program: *Biology Education, Grades 8-12*

Date Submitted: *December, 2017*

Certification Level:	☐ B-P ☐ P-5 ☐ 5-9 ☐ 5-12 ☒ 8-12 ☐ P-12	
Preparation Level:	☒ Initial	
Modes of Delivery:	☐ Face-to-Face Only ☐ Online Only ☒ Hybrid	
Degree Type:	☒ Undergraduate ☒ Undergraduate – Cert Only	☐ Graduate (MAT) ☐ Option 6
Program Codes:	**525 or 617, 774 EPSB BS-3 Cert Only-3803**	
University Catalog:	https://www.wku.edu/undergraduatecatalog/ http://catalog.wku.edu/graduate/	
WKU Quality Assurance Document:	http://www.wku.edu/cebs/caep/	

SYLLABI: All Professional Education, Methods Syllabi, and a Sampling of Content Area Syllabi are available on the WKU website http://www.wku.edu/cebs/peu/epsb_prds.php.

Program Description

The initial teacher preparation program in biological science begins the professional development process for grades 8-12 biology teachers is designed and constructed in accordance with the principles presented in the unit's conceptual framework. Each candidate in this program completes a major in biology, 36-48 semester hours of specifically identified biology courses plus 20 semester hours of supporting courses in related sciences. These course requirements are in addition to 47 semester hours of general education and relate directly to the Kentucky Program of Study and guidelines of the National Science Teachers Association for certification in biology

- **Core Education Courses**

SMED 101. STEP 1: INTRODUCTION TO INQUIRY-BASED APPROACHES TOTEACHING. (1 hr) Introduction to theory and practice necessary to design and deliver high quality inquiry-based math and science instruction. Students explore and practice the guided inquiry process, create lesson plans and implement them during visits to elementary classrooms. Fieldwork required.

SMED 102. STEP 2: INTRODUCTION TO INQUIRY-BASED LESSON DESIGN. (2 hrs) Further exploration of inquiry-based learning experiences, developing skills designing, teaching, analyzing, and assessing inquiry-based math and science lessons. Students design lesson plans and implement them during visits to middle school classrooms. Fieldwork required.

SMED 300. MIDDLE GRADES SCIENCE SKILLS AND METHODS. (3 hrs) Laboratory-based introduction to the science skills and methods needed by middle school teachers.

SMED 301. DESIGNING AND TEACHING INQUIRY-BASED MATHEMATICS AND SCIENCE UNITS. (3 hrs) Develops students' skills in designing, teaching, analyzing, and assessing inquiry-based math and science lessons and units within multiple and diverse field experiences. Fieldwork required.

SMED 310. KNOWING AND LEARNING IN MATHEMATICS AND SCIENCE. (3 hrs) Introduction to theories and principles of cognition and learning with emphasis on knowing and learning in math and science. Introduction to research on learning, memory, individual development, motivation and intelligence. Applications of learning theory will be explicitly tied to design of lesson plans, instruction and assessment.

SMED 320. CLASSROOM INTERACTIONS. (3 hrs) Designed to expand students' abilities to understand how learning theories are applied in instructional settings as students develop, implement and evaluate activities and strategies for teaching diverse students equitably. Fieldwork required.

SMED 340. PERSPECTIVES ON MATHEMATICS AND SCIENCE. (3 hrs) Introduction to the historical, social, and philosophical implications of math and science through investigations of pivotal experiments and findings. Includes integrated laboratory experiences that replicate significant discoveries.

SMED 360. RESEARCH METHODS FOR MATH AND SCIENCE TEACHERS. (3 hrs) Laboratory-based introduction to the tools and techniques used by scientists and mathematicians to further an understanding of the natural world and application of this knowledge to math and science education. Students will design and carry out laboratory investigations, and present written and oral reports of results.

SMED 400. APPLYING MIDDLE GRADE SCIENCE ACROSS DISCIPLINES. (3 hrs) Introduction to the knowledge and skills needed to create middle grades science lessons that incorporate content and real-world examples from different disciplines.

SMED 470. PROJECT-BASED INSTRUCTION. (3 hrs) Methods, techniques, and technologies used to implement and assess problem-based investigations in math and science classrooms. Fieldwork required.

SMED 489. SMED STUDENT TEACHING SEMINAR. (3 hrs) Provides a bridge between the theory and practice of math and science teaching. Methods, techniques, technologies and issues pertinent to math and science instruction in middle grade and secondary classrooms. Field experiences in public schools and/or other appropriate settings away from campus are required.

LTCY 421. CONTENT AREA READING IN THE MIDDLE AND SECONDARY GRADES. (3 hrs) A course in reading designed to offer a detailed view of the principles, materials and methods of instruction for middle and secondary grade students. Field experiences in public schools and / or other appropriate settings away from campus are required.

SPED 330. INTRODUCTION TO EXCEPTIONAL EDUCATION: DIVERSITY IN LEARNING. (3 hrs) Characteristics of exceptionality, special education programs, schools, and community resources and research relative to exceptionality. Field experiences in public schools and / or other appropriate settings away from campus are required in this course.

SEC 490. STUDENT TEACHING. (10 hrs) Must complete a minimum of sixteen weeks in one or two placements depending on certification requirements. Students follow the academic calendar of the school district in which they are placed and are responsible for providing their own transportation to assigned site(s).

- **Core Content Courses**

BIOL 120. BIOLOGICAL CONCEPTS: CELLS METABOLISM AND GENETICS. (3 hrs) Introductory course in biology that emphasizes cellular organization and processes, metabolism, DNA structure and replication, and Mendelian and population genetics.

BIOL 121. BIOLOGICAL CONCEPTS: CELLS, METABOLISM, AND GENETICS LAB. (1 hr) Introductory laboratory in biology that emphasizes the experimental aspects of cellular organization and processes, metabolism, DNA structure and replication, and Mendelian and population genetics.

BIOL 122. BIOLOGICAL CONCEPTS: EVOLUTION, DIVERSITY, AND ECOLOGY. (3 hrs) Introductory course in biology that emphasizes evolutionary patterns and processes, diversity of life (bacteria, archaea, protists, plants, fungi, and animals), ecological principles, and conservation and management.

BIO 123 Biological Concepts: Evolution, Diversity, and Ecology Lab. Introductory laboratory in biology for science majors that emphasizes the experimental aspects of evolutionary patterns and processes, diversity of life (bacteria, archaea, protists, plants, fungi, and animals), ecological principles, and conservation and management. Corequisite BIOL 122.

- **Restricted Electives (at least one course from each of the following 3 groups):**

Group A - BIO 222/223, BIO 224/225, BIO 226/227 (choose one)

BIO 222 Plant Biology and Diversity. Survey of cyanobacteria, algae and plants with an emphasis on anatomy, morphology, development, physiology and evolutionary adaptations. Corequisite: BIOL 223 Prerequisites: BIOL 120/BIOL 121 and BIOL 122/BIOL 123.

BIO 223 Plant Biology and Diversity Lab. A laboratory course correlated with BIOL 222. Laboratory, two hours. Corequisite or prerequisite: BIOL 222.

BIO 224 Animal Biology and Diversity. Prerequisites: BIOL 120/BIOL 121 and BIOL 122/BIOL 123 Survey of animal phyla and major classes with emphasis upon morphological adaptations and biological systems that have evolved to maintain organismal and population homeostasis. Corequisite: BIOL 225.

BIO 225 Animal Biology and Diversity Lab. A laboratory course correlated with BIOL 224. Laboratory, two hours. Prerequisite or corequisite: BIOL 224.

BIO 226 Microbial Biology and Diversity. A study of morphological, cultural, and biochemical characteristics of important groups of bacteria. Lecture, three hours. Corequisite: BIOL 227 Prerequisites: BIOL 120/BIOL 121 and BIOL 122/BIOL 123.

BIO 227 Microbial Biology and Diversity Lab. A laboratory course correlated with BIOL 309. Laboratory, two hours. Corequisite: BIOL 226.

Group B – BIO 319/322 OR BIO 327/337 (choose one)

BIO 319 Introduction to Molecular and Cell Biology. Introduction to molecular and cell structure, relating molecular structure and function to cell structure and function. Special emphasis on protein and nucleic acid structure and function and their role in coordinating cellular activities. Lecture, three hours. Corequisite: BIOL 221 Prerequisites: BIOL 120/BIOL 121 and BIOL 122/BIOL 123 and CHEM 120/CHEM 121.

BIO 322 Introduction to Molecular and Cell Biology Lab. Laboratory course presenting fundamental techniques for the isolation and characterization of biological molecules, with an emphasis on proteins and nucleic acids. Laboratory two hours. Co-requisite: BIOL 220.

BIO 327 Genetics. A study of the fundamental principles of heredity as applied in eukaryotic organisms. Lecture, three hours; laboratory, two hours. Prerequisites: BIOL 120/BIOL 121 and BIOL 122/BIOL 123.

BIOL 337. Genetics Laboratory. Prerequisite or concurrent prerequisite: BIOL 327. A laboratory-based study of genetics, genomics, and population genetics. Modern laboratory techniques are emphasized. Course fee. * Co-requisite: BIO 327.

Group C – BIO 315, BIO 316 (choose one)

BIO 315 Ecology. A study of the fundamental principles of the ecology. Laboratory work includes field research and computer techniques for analysis and synthesis. A field trip may be required. Lecture, three hours; laboratory, three hours. Prerequisites: BIOL 222/BIOL 223 or BIOL 224/BIOL 225 or BIOL 226/BIOL 227.

BIO 316 Evolution. Theory and Processes. Study of the genetic, behavioral and ecological mechanisms leading to evolutionary change, and the role of evolutionary theory as a unifying framework in biology. Lecture, three hours. Prerequisite: BIOL 220 or BIOL 327 or BIOL 319.

Supporting Courses:

AGRO 454. SOIL MANAGEMENT AND CONSERVATION. (3) Prerequisite: AGRO 350. Economic utilization of land for agricultural, recreation and public purposes based on location and capability characteristics; interpretation and application of soil survey information for best interests in crop production, conservation, public and industrial use; practice in designing land use maps are stressed.

AGRO 455. SOIL CHEMISTRY. (2) Prerequisite: AGRO 350. Corequisite: AGRO 456. Analytical techniques used in soil chemistry and soil fertility; studies nutrient determination, colloidal systems, chemical properties related to plant nutrition.

AGRO 456. SOIL CHEMISTRY LABORATORY. (1) Corequisite: AGRO 455. A laboratory course correlated with AGRO 455.

AGRO 457. SOIL FORMATION, CLASSIFICATION AND MAPPING. (2) Prerequisite: AGRO 350 and permission of instructor. Corequisite: AGRO 458. Soil origin; classification schemes; profile description, mapping and interpretation of soil survey information emphasizing Kentucky soils, are discussed.

AGRO 458. SOIL FORMATION, CLASSIFICATION AND MAPPING LABORATORY. (1) Corequisite: AGRO 457. A laboratory course correlated with AGRO 457.CHEM 120. COLLEGE CHEMISTRY I. (3 hrs) The first half of the standard yearlong general chemistry course sequence for science majors and minors.

BIOL 382. INTRODUCTORY BIOSTATISTICS. (3) Prerequisites: BIOL 120 /121 and BIOL 122 / 123 with grades of "C" or higher or consent of instructor; MATH 117 (or equivalent or higher). Introduction to statistical techniques and experimental design applied to the biological sciences. Probability and distributions, descriptive statistics, hypothesis testing and statistical inference using t-statistics, regression, ANOVA, chi-square, non-parametric tests. Use of computers and analysis of real data are emphasized. *

CHEM 121. COLLEGE CHEMISTRY I LABORATORY. (2 hrs) One third of each meeting is spent reviewing material from the lecture and the remaining time is used to carry out laboratory investigations. Pre-lab lecture and laboratory meet once each week for three hours per week.

CHEM 222. COLLEGE CHEMISTRY II. (3) Prerequisites: CHEM 120-121 with a grade of "C" or better. Corequisite: CHEM 223. A continuation of the first year course in chemistry for science majors and minors. It is also satisfactory for general education requirements for non-science majors and minors.

CHEM 223. COLLEGE CHEMISTRY II LABORATORY. (2) Corequisite: CHEM 222. Laboratory to accompany CHEM 222. Laboratory to accompany CHEM 222. Pre-lab and laboratory meet for four hours per week. Course Fee

CHEM 330. QUANTITATIVE ANALYSIS. (5) Prerequisites: CHEM 222-223 with a grade of "C" or better. A study of the common techniques and theory of gravimetric, volumetric, electrochemical, and optical methods of analysis. Lecture, 3 hours; laboratory 2 hours. Laboratory meets four and one-half hours per week. Priority for registration for this course will be given to rising sophomores and rising juniors.

CHEM 340. ORGANIC CHEMISTRY I. (3) Prerequisites: CHEM 222-223 with a grade of "C" or better. Corequisite: CHEM 341. The first half of the standard one year course for chemistry majors. Discussion includes various organic mechanisms and preparations. The entire sequence of CHEM 340-341, 342-343 should be completed. If only one semester of organic chemistry is desired, CHEM 314 should be taken.

CHEM 341. LAB ORGANIC CHEMISTRY I. (2) Prerequisites: CHEM 222-223 with a grade of "C" or better. Corequisite: CHEM 340. Laboratory work includes studies of typical organic reactions and preparations. Course Fee

CIS 226. INTRODUCTION TO VISUAL PROGRAMMING. (3) A study in the algorithmic approach of the analysis of problems and their solutions. A visual programming language will be introduced and used in solving assigned problems. Laboratory work will be required outside of class meetings. Course Fee

CIS 243. PRINCIPLES OF MIS. (3) Prerequisite: CIS 141 or CSCI 145C. The basis of information systems and how they fit into a decision-making environment. An introduction to systems analysis in relation to managing information systems. Strategic uses of information technology throughout the business enterprise. Course Fee

CS 146. INTRODUCTION TO PROGRAMMING. (3) Prerequisite: Two years of high school algebra or concurrent enrollment in a college algebra course. A study of the algorithmic approach in the analysis of problems and their computational solutions. A structured language will be introduced and used in solving assigned problems. Lab sessions may be held in addition to lecture sessions. Not acceptable for credit in computer science major or minor. Colonnade F-QR | QR

GISC 316. FUNDAMENTALS OF GEOGRAPHIC INFORMATION SYSTEMS. (4) Prerequisites: GEOG 103 or GEOL 103, GEOG 110; or permission of the instructor. Fundamentals of GIS data management and cartographic design. Topics include data organization, map projections, scale, and accuracy. Hands-on work in geospatial data acquisition, base map development, and map production. Course Fee

GISC 317. GEOGRAPHIC INFORMATION SYSTEMS. (4) Prerequisites: GISC 316 with a grade of "C" or better, or permission of instructor. The principles, concepts, and applications of GIS. Topics include raster and vector data modules, GIS data sources, data acquisition, storage, management, structured query language, relational databases, GIS analysis and display. Course Fee

GISC 417. GIS ANALYSIS AND MODELING. (3) Prerequisite: GISC 317 with a grade of "C" or better or instructor's permission. Develops expertise with a broad range of spatial analysis and modeling functions using GIS. A problem-oriented approach. Course Fee

MATH 116 / MA 116C. COLLEGE ALGEBRA. (3) Prerequisites: Math ACT score of 22 or better or Math SAT score of 510 or better or a score of 14 or better on the WKU Math Placement Exam or a score of 14 or better on the KYOTE or a score of 50 or better on the COMPASS (College Algebra domain) or DMA 096C with a grade of "C" or better. Graphing and problem solving are integrated throughout the study of polynomial, absolute value, rational, radical, exponential, and logarithmic functions. (Graphing calculator required.). Colonnade F-QR | QR

MATH 117 / MA 117C. TRIGONOMETRY. (3) Prerequisites: Four years of high school mathematics including Algebra I and II and geometry, and satisfactory score on Math Placement Exam; or MATH 116 with a grade of "C" or better. Unit circle; trigonometric functions and graphs; trigonometric identities and equations; right triangle trigonometry; laws of sines and cosines; DeMoivre's Theorem; vectors and applications of trigonometry. (Graphing calculator required.) Colonnade F-QR | QR

MATH 137. CALCULUS II. (4) Prerequisites: MATH 136 with a grade of "C" or better A second course in one-variable calculus including topics from analytic geometry. Methods of integration, sequences and series, polar and parametric functions. Includes lecture and recitation.

MATH 142. CALCULUS WITH APPLICATIONS FOR LIFE SCIENCES. (5) Prerequisites: Four years of high school mathematics, including Algebra I and II, geometry, and a course that includes trigonometry, and satisfactory Math ACT and math placement scores; or MATH 117 or MATH 118, with a grade of "C" or better.
Exponential and logarithmic functions, derivatives, integration, first order differential equations, and systems of linear equations, with major emphasis on applications in life sciences. Colonnade F-QR | QR

MATH 305. INTRODUCTION TO MATHEMATICAL MODELING. (3) Prerequisite: MATH 137 with a grade of "C" or better. Theory and computer implementation of mathematical models. Deterministic, stochastic, discrete, continuous, and matrix models. Introduction to advanced topics such as linear algebra, differential and difference equations, probability, stochastic processes, and dynamical systems.

MATH 307. INTRODUCTION TO LINEAR ALGEBRA. (3) Prerequisites: MATH 136 with an A or MATH 142 with an A or MATH 137 with a C or better. Systems of linear equations, matrix algebra, vector spaces, inner product spaces, linear transformations, eigenvectors, quadratic forms.

PHYS 231. INTRODUCTION TO PHYSICS AND BIOPHYSICS I. (3) Prerequisites: High school algebra and geometry. Corequisite: PHYS 232 (Course and laboratory must be taken together or dropped together.) The first half of a basic course for students of the life sciences, covering the topics of mechanics, heat and thermodynamics, properties of matter, waves and sound. Emphasis is on an understanding of the physical principles operative in biological systems and on the application of physical methods in biology and medicine.

PHYS 232. LABORATORY FOR PHYSICS AND BIOPHYSICS I. (1) Corequisite: PHYS 231. Required for students enrolled in 231. Students perform physics experiments on mechanics, fluids, sound, heat and thermodynamics. Course Fee PHYS 233. LABORATORY FOR PHYSICS AND BIOPHYSICS II. (1)

PHYS 233. LABORATORY FOR PHYSICS AND BIOPHYSICS II. (1) Corequisite: PHYS 332. Required for students enrolled in 332. Students perform physics experiments in electricity, magnetism and optics. Course Fee

PHYS 255. UNIVERSITY PHYSICS I. (4) Prerequisite: MATH 136 with a grade of “C” or better. Corequisites: MATH 137 and PHYS 256. This is the first half of a yearlong course in calculus-based physics suggested for students in the physical sciences and mathematics. Definitions, concepts, and problem solving will be emphasized. Topics include kinematics, dynamics, energy, conservation laws, rotation, harmonic motion, mechanical waves and thermodynamics. Colonnade ENS| NS

PHYS 256. UNIVERSITY PHYSICS I LAB. (1) Corequisite: PHYS 255. Required for students enrolled in PHYS 255. Students perform physics experiments in mechanics and thermodynamics which stress the fundamental definitions and laws developed in the lecture course. Students gain experience in computerized data acquisition and data analysis using modern techniques and equipment. Course Fee | Colonnade E-SL | SL

PHYS 332. INTRODUCTION TO PHYSICS AND BIOPHYSICS II. (3) Prerequisite: PHYS 231. Corequisite: PHYS 233 (Course and laboratory must be taken together or dropped together.) The second half of a basic course for students of the life sciences, covering the topics of electricity, magnetism, light optics, atomic and nuclear physics. Emphasis is on an understanding of the physical principles operative in biological systems and on the application of physical methods in biology and medicine.

1. INITIAL PREPARATION EARLY FIELD AND CLINICAL EXPERIENCES: The table below delineates the alignment between program courses and the EPSB required categories for early field and clinical experiences.

Course Name	Hours	School Level			EPSB REQUIRED EXPERIENCES CATEGORIES							
		ELEM	MIDDLE	HIGH	a. Engage with diverse students	b. Observe in Family Resource or Youth Services Center	c. Tutor	d. Interact with student families	e. Attend school board	e. Attend school-based council	f. Participate in professional learning community	g. Assist teacher/ other school professionals
SMED 101	30	X			X	X					X	X
SMED 102	30		X		X	X						X
SMED 310	20		X	X	X	X						X
SMED 320	40		X	X	X	X						X
SMED 340	20		X	X	X					X		X
SMED 360	20		X	X	X							X
SMED 470	40		X	X	X		X	X	X		X	X
SPED 330	15		X	X	X	X		X				
LTCY 421	15			X	X		X					X
Total Hours	**230**											

2. KENTUCKY TEACHER PERFORMANCE STANDARDS ALIGNMENT: The table delineates how the EPP-wide Initial Preparation Key Assessments, aligned to both Kentucky Teacher Performance and InTASC Standards, are embedded in the program.

KEY ASSESSMENTS					
AREA		**NAME**	**STANDARD ALIGNMENT**		**COLLECTED**
			KTS	**InTASC**	
1	Content Assessment	Praxis II	(1)	(4,5)	Praxis Report
2	Other Content Assessment	Major GPA	(1)	(4)	Prior to Student Teaching
3	Assessment of Professional Capabilities	Praxis PLT	(2-10)	(1-3,6-10)	Praxis Report
4	Clinical Experiences Measure of Teaching Proficiency	Student Teacher Evaluation	1-10	1-10	SEC 490
5	Measure of Assessment Proficiencies	A: Learning Goals & Pre/Post Assessment B: Analysis of Student Learning	1-3,5-7	1-10	SMED 320
6	Ability to Diagnose and Prescribe for Personalized Student Learning	Design for Instruction	1,2,5,6	1,4-10	SMED 470
7	Application of Content Knowledge and Pedagogical Skills	Teacher Work Sample	1-3,5-7,9	1-10	SMED 489
8	Assessment of Literacy Outcomes	Operational Stance Concerning Content-Area and Discipline-Specific Literacies	1,2,5	1,4-7	LTCY 421
9	Dispositions	Dispositions Form	NA	NA	SMED 102, SMED 320, SMED 470, SEC 490
10	KTS Exit Survey	KTS Exit Survey	1-10	1-10	SMED 489

3. COURSE EXPERIENCES ADDRESSING LEARNED SOCIETY SPA STANDARDS: The table below delineates the alignment between program courses and the appropriate SPA standards.

SPA Standard # and Description **National Science Teachers Association**	**Course Alignment**											
	SMED 101	SMED 102	SMED 310	SMED 320	SMED 340	SMED 360	SMED 470	SMED 489	SEC/ MGE 490	SMED 300	SMED 400	
Standard 1: Content Knowledge Effective teachers of science understand and articulate the knowledge and practices of contemporary science. They interrelate and interpret important concepts, ideas, and applications in their fields of licensure	X	X	X	X	X	X	X	X	X	X	X	
Standard 2: Content Pedagogy Effective teachers of science understand how students learn and develop scientific knowledge. Preservice teachers use scientific inquiry to develop this knowledge for all students.	X	X	X	X	X	X	X	X	X	X	X	
Standard 3: Learning Environments Effective teachers of science are able to plan for engaging all students in science learning by setting appropriate goals that are consistent with knowledge of how students learn science and are aligned with state and national standards. The plans reflect the nature and social context of science, inquiry, and appropriate safety considerations. Candidates design and select learning activities, instructional settings, and resources--including science-specific technology, to achieve those goals; and they plan fair and equitable assessment strategies to evaluate if the learning goals are met.	X	X	X	X	X	X	X	X	X	X	X	
Standard 4: Safety Effective teachers of science can, in a P-12 classroom setting, demonstrate and maintain chemical safety, safety procedures, and the ethical treatment of living organisms needed in the P-12 science classroom appropriate to their area of licensure	X	X	X	X	X	X	X	X	X	X	X	
Standard 5: Impact on Student Learning Effective teachers of science provide evidence to show that P-12 students' understanding of major science concepts, principles, theories, and laws have changed as a result of instruction by the candidate and that student knowledge is at a level of understanding beyond memorization. Candidates provide evidence for the diversity of students they teach.	X	X	X	X	X	X	X	X	X	X	X	
Standard 6: Professional Knowledge and Skills Effective teachers of science strive continuously to improve their knowledge and understanding of the ever changing knowledge base of both content, and science pedagogy, including approaches for addressing inequities and inclusion for all students in science. They identify with and conduct themselves as part of the science education community	X	X	X	X	X	X	X	X	X	X	X	

SPA Standard # and Description **National Science Teachers Association**	**Course Alignment**											
	Biol 120	Biol 121	Biol 122	Biol 123	Biol 222/ 223	Biol 224/ 225	Biol 226/ 227	Biol 319/ 322	Biol 327/ 337	Biol 315	Biol 316	
Standard 1: Content Knowledge Effective teachers of science understand and articulate the knowledge and practices of contemporary science. They interrelate and interpret important concepts, ideas, and applications in their fields of licensure	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Standard 2: Content Pedagogy Effective teachers of science understand how students learn and develop scientific knowledge. Preservice teachers use scientific inquiry to develop this knowledge for all students.												
Standard 3: Learning Environments Effective teachers of science are able to plan for engaging all students in science learning by setting appropriate goals that are consistent with knowledge of how students learn science and are aligned with state and national standards. The plans reflect the nature and social context of science, inquiry, and appropriate safety considerations. Candidates design and select learning activities, instructional settings, and resources--including science-specific technology, to achieve those goals; and they plan fair and equitable assessment strategies to evaluate if the learning goals are met.												
Standard 4: Safety Effective teachers of science can, in a P-12 classroom setting, demonstrate and maintain chemical safety, safety procedures, and the ethical treatment of living organisms needed in the P-12 science classroom appropriate to their area of licensure		**X**		**X**	**X**	**X**	**X**	**X**	**X**			
Standard 5: Impact on Student Learning Effective teachers of science provide evidence to show that P-12 students' understanding of major science concepts, principles, theories, and laws have changed as a result of instruction by the candidate and that student knowledge is at a level of understanding beyond memorization. Candidates provide evidence for the diversity of students they teach.												
Standard 6: Professional Knowledge and Skills Effective teachers of science strive continuously to improve their knowledge and understanding of the ever changing knowledge base of both content, and science pedagogy, including approaches for addressing inequities and inclusion for all students in science. They identify with and conduct themselves as part of the science education community												

4. CURRICULUM CONTRACT:

CURRICULUM CONTRACT

Undergraduate Degree Program – B.S., Biology (Reference #525 or 617)

B.S. Science and Math Education (Reference #774)

Leading to Initial Teacher Certification (Rank III) in Biology Education, Grades 8-12 (EPSB #3)

Admission Requirements:

To be admitted into this program, candidates must meet all minimal criteria described on the "Transition Points" page under "Transition Point 1: Admission to Education Preparation Programs."

Science/Math Education Component—37 hours	
SMED 101 – Step 1	1 hr.
SMED 102 – Step 2	2 hrs.
SMED 310 – Knowing & Learning	3 hrs.
SMED 320 – Classroom Interactions	3 hrs.
SPED 330 – Diversity in Learning	3 hrs.
SMED 340 – Perspectives	3 hrs.
SMED 360 – Research Methods	3 hrs.
SMED 470 – Project-based Instruction	3 hrs.
LTCY 421 – Reading for Middle/Second	3 hrs.
SMED 489 – Student Teaching Seminar	3 hrs.
SEC 490 – Student Teaching	10 hrs
Colonnade Plan Component—39 hours	
See WKU catalog website for guidance in selecting appropriate coursework to meet WKU's Colonnade Plan requirements.	

Specialty Studies – Biology Major*	
BIOL 120/121 – Biol Conc Cell Metab Genetics & Lab	4 hrs
BIOL 122/123 – Biol Conc Evol Div Ecol & Lab	4 hrs
Restricted Electives (11-12.5 hrs.)	
Choose one course from each of the following groups:	
Group A:	4 hrs
BIOL 222/223 – Plant Biology & Diversity & Lab	
BIOL 224/225 – Animal Biology & Diversity & Lab	
BIOL 226/227 – Microbial Biol & Diversity & Lab	
Group B:	4 hrs
BIOL 319/322 – Intro to Molecular & Cell Biology & Lab	
BIOL 327/337 – Genetics & Lab	
Group C:	3 hrs
BIOL 315 (3 hrs.) - Ecology	
BIOL 316 (3 hrs.) - Evolution	
Biology (BIOL) Electives	12.5-17 hrs
16 hrs. for Biology major with minor or second major (Ref. #617)	
28 hrs. for Biology maor with NO minor (Ref #525)	
Note: that ½ of total Biology hours for either major must be at the 300-400 level or above	
Note: students must take 3 (Ref #617) - 5 (Ref #525) designated laboratory classes.	
Note: students must take one course designated as a Science process course.	
Total:	36-48 hrs
*** Supporting Courses also required:**	19-24 hrs
CHEM 120/121	4 hrs
MATH 116/117	6 hrs
PHYS 231/232 or 255/256	4 hrs
Two courses from the following list:	6-10 hrs
AGRO 454 OR AGRO;455/456 OR 457/458	
BIOL 383, CHEM 222/223	
CHEM 314 OR CHEM 340/341, CHEM 330,	
CIS 243, CIS 226 OR CS 226 OR CS 146, GISC 316	
GISC 317, GEOG 328, GISC 417, MATH 136,	

MATH 137, MATH 142, MATH 305, MATH 307	
PHYS 332/233 or PHYS 255/256, SOCL 302	
Grand total hours	**128 hrs.**

Mid-Point Assessment Requirements:
To be admitted into the Student Teaching Semester, candidates must meet all minimal criteria described under "Transition Point 2: Admission to Final Clinical Experience."

Program Completion Requirements:
1. To complete a teacher preparation program, candidates must meet all minimal criteria described under "Transition Point 3: Program Exit."
2. Note that additional requirements (described below) must be met in order to be recommended for initial certification.
3. Rules and regulations governing the completion of this program of study have been described above and on the next page. By your signature, you are acknowledging that you understand and accept responsibility for meeting these requirements.

Delineation of EPP-Wide Transition Points – Initial Preparation Program

Transition Point 1: Admission to Education Preparation Programs				
Data Reviewed	***Minimal Criteria***	***Review Cycle***	***Reviewed By***	***Approved By***
Unit Level Data:	***Admission to Teacher Education***			
• Cumulative GPA • CASE test scores • Application to include: – 3 faculty recommendations – Physical (including TB test) – KY criminal background check – Signed KY Code of Ethics	• 2.75+ average or above • Minimum CASE scores required as defined by current state guidelines (demonstrates Critical Thinking and Communication Skills) • 3 positive faculty recommendations (demonstrates their dispositions for teaching indicating their creativity and collaboration skills) • Passing physical • Passing background checks	Each Month	Office of Teacher Services	Professional Education Council
Transition Point 2: Admission to Final Clinical Experience				
Data Reviewed	***Minimal Criteria***	***Review Cycle***	***Reviewed By***	
Unit Level Data	*Successful application to Student Teaching*			
• GPAs and at least 90+ hours completed (including 75% of content courses) • Completion of required field hours • Completion of Key Assessments • Dispositions scores	• 2.75+ GPA (overall, major, minor, and professional education courses); C or higher in all professional education courses • At least 200 hours documented based on requirements of 16 KAR 5:040 • 2+ holistic score; 2+ per KTS measured • All dispositions average "At Standard" (3+)	Each Semester	Office of Teacher Services	Professional Education Council
Transition Point 3: Program Exit				
Data Reviewed	***Minimal Criteria***	***Review Cycle***	***Reviewed By***	
Unit Level Data:	*Program Exit*			
• Candidate student teaching • Teacher Work Sample scores • Dispositions scores	• C or Higher • 2+ holistic score; 2+ per KTS measured • All scores "At Standard" (3+)	Each Semester	Office of Teacher Services	Certification Officer

To be recommended for initial certification, an applicant must document:
Completion of an approved educator preparation program in each desired certification area; Passing score(s) on the appropriate PRAXIS II and PLT exam(s) or other assessments required for each desired certification area; Achievement of at least a 2.75 GPA overall, in each major and minor, and in professional education courses; Attainment of at least a "C" in all professional education courses, including student teaching.

Remediation Opportunities:
TP 1: Candidates may continue to submit Faculty Recommendations until three are positive.
TP 2: Candidates may request additional instruction from faculty and may resubmit Key Assessments in order to improve their scores.
TP 3: Candidates may request additional instruction from faculty and may resubmit the Teacher Work Sample Key Assessment in order to improve their score. Candidates may repeat student teaching.

EPSB Disclaimer: 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.epsb.ky.gov for current requirements or contact the EPSB at 502-564-4606 or toll free 888-598-7667.

By signing below, the candidate ensures that he or she has been advised of, understands, and agrees to adhere to all program requirements, including assessment requirements, of the program.

Candidate Name (printed):

Education Advisor's Signature/Date:

Signature Date

Candidate Signature/Date:

Signature Date

Specialization Advisor's Signature/Date (if needed):

Signature Date

****END OF CURRICULUM CONTRACT****

CURRICULUM CONTRACT

Biology Education Certification Only

Non-degree seeking Certification Only in Biology Education, Grades 8-12 (EPSB #3803)

(This program does not lead to a degree)

Admission Requirements:

To be admitted into this program, candidates must meet all minimal criteria described on the "Transition Points" page under "Transition Point 1: Admission to Education Preparation Programs."

Science/Math Education Component—37 hours	
SMED 101 – Step 1	1 hr.
SMED 102 – Step 2	2 hrs.
SMED 310 – Knowing & Learning	3 hrs.
SMED 320 – Classroom Interactions	3 hrs.
SPED 330 – Diversity in Learning	3 hrs.
SMED 340 – Perspectives	3 hrs.
SMED 360 – Research Methods	3 hrs.
SMED 470 – Project-based Instruction	3 hrs.
LTCY 421 – Reading for Middle/Second	3 hrs.
SMED 489 – Student Teaching Seminar	3 hrs.
SEC 490 – Student Teaching	10 hrs

Specialty Studies – Biology Major*	
BIOL 120/121 – Biol Conc Cell Metab Genetics & Lab	4 hrs
BIOL 122/123 – Biol Conc Evol Div Ecol & Lab	4 hrs
Restricted Electives (11-12.5 hrs.)	
Choose one course from each of the following groups:	
Group A:	4 hrs
BIOL 222/223 – Plant Biology & Diversity & Lab	
BIOL 224/225 – Animal Biology & Diversity & Lab	
BIOL 226/227 – Microbial Biol & Diversity & Lab	
Group B:	4 hrs
BIOL 319/322 – Intro to Molecular & Cell Biology & Lab	
BIOL 327/337 – Genetics & Lab	
Group C:	3 hrs
BIOL 315 (3 hrs.) - Ecology	
BIOL 316 (3 hrs.) - Evolution	
Biology (BIOL) Electives	12.5-17 hrs
16 hrs. for Biology major with minor or second major (Ref. #617)	
28 hrs. for Biology maor with NO minor (Ref #525)	
Note: that ½ of total Biology hours for either major must be at the 300-400 level or above	
Note: students must take 3 (Ref #617)-5 (Ref #525) designated laboratory classes.	
Note: students must take one course designated as a Science process course.	
Total:	36-48 hrs
*** Supporting Courses also required:**	19-24 hrs
CHEM 120/121	4 hrs
MATH 116/117	6 hrs
PHYS 231/232 or 255/256	4 hrs
Two courses from the following list:	6-10 hrs
AGRO 454 OR AGRO;455/456 OR 457/458	
BIOL 383, CHEM 222/223	
CHEM 314 OR CHEM 340/341, CHEM 330,	
CIS 243, CIS 226 OR CS 226 OR CS 146, GISC 316	
GISC 317, GEOG 328, GISC 417, MATH 136,	
MATH 137, MATH 142, MATH 305, MATH 307	
PHYS 332/233 or PHYS 255/256, SOCL 302	

Mid-Point Assessment Requirements:
To be admitted into the Student Teaching Semester, candidates must meet all minimal criteria described under "Transition Point 2: Admission to Final Clinical Experience."

Program Completion Requirements:
4. To complete a teacher preparation program, candidates must meet all minimal criteria described under "Transition Point 3: Program Exit."
5. Note that additional requirements (described below) must be met in order to be recommended for initial certification.
6. Rules and regulations governing the completion of this program of study have been described above and on the next page. By your signature, you are acknowledging that you understand and accept responsibility for meeting these requirements.

Delineation of EPP-Wide Transition Points – Initial Preparation Program

Transition Point 1: Admission to Education Preparation Programs				
Data Reviewed	***Minimal Criteria***	***Review Cycle***	***Reviewed By***	***Approved By***
Unit Level Data:	***Admission to Teacher Education***			
• Documentation of completion of baccalaureate degree in an approved certification area • Cumulative GPA • CASE test scores • Application to include: – 3 faculty recommendations – Physical (including TB test) – KY criminal background check – Signed KY Code of Ethics	• Completion of Application • 2.75+ average or above • Minimum CASE scores required as defined by current state guidelines (demonstrates Critical Thinking and Communication Skills) • 3 positive faculty recommendations (demonstrates their dispositions for teaching indicating their creativity and collaboration skills) • Passing physical • Passing background checks	Each Month	Office of Teacher Services	Professional Education Council
Transition Point 2: Admission to Final Clinical Experience				
Data Reviewed	***Minimal Criteria***	***Review Cycle***	***Reviewed By***	
Unit Level Data	*Successful application to Student Teaching*			
• GPAs and at least 90+ hours completed (including 75% of content courses) • Completion of required field hours (dependent on current certification status) • Completion of Key Assessments • Dispositions scores	• 2.75+ GPA (overall, major, minor, and professional education courses); C or higher in all professional education courses • At least 200 hours documented based on requirements of 16 KAR 5:040 • 2+ holistic score; 2+ per KTS measured • All dispositions average "At Standard" (3+)	Each Semester	Office of Teacher Services	Professional Education Council
Transition Point 3: Program Exit				
Data Reviewed	***Minimal Criteria***	***Review Cycle***	***Reviewed By***	
Unit Level Data:	*Program Exit*			
• Candidate student teaching • Teacher Work Sample scores • Dispositions scores	• C or Higher • 2+ holistic score; 2+ per KTS measured • All scores "At Standard" (3+)	Each Semester	Office of Teacher Services	Certification Officer

To be recommended for initial certification, an applicant must document:
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Signature Date

Candidate Signature/Date:

Signature Date

Specialization Advisor's Signature/Date (if needed):

Signature Date

****END OF CURRICULUM CONTRACT****