



Program Review Document

Preparation Program: *Secondary Chemistry Education*

Date Submitted: *May 2017*

Certification Level:	<input type="checkbox"/> B-P <input type="checkbox"/> P-5 <input type="checkbox"/> 5-9 <input type="checkbox"/> 5-12 <input checked="" type="checkbox"/> 8-12 <input type="checkbox"/> P-12
Preparation Level:	<input checked="" type="checkbox"/> Initial
Modes of Delivery:	<input type="checkbox"/> Face-to-Face Only <input type="checkbox"/> Online Only <input checked="" type="checkbox"/> Hybrid
Degree Type:	<input checked="" type="checkbox"/> Undergraduate <input type="checkbox"/> Graduate (MAT) <input checked="" type="checkbox"/> Undergraduate – Cert Only <input type="checkbox"/> Option 6
Program Codes:	623 774
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 secondary science education with an emphasis in chemistry that begins the professional development process for grades 8-12 chemistry teachers is designed and constructed in accordance with the principles presented in the unit's conceptual framework. Each candidate in this program completes a comprehensive major in chemistry. The content of these courses are based on the guidelines provided by the American Chemical Society's Committee on Professional Training (ACSCPT) and the National Science Teachers' Association Standards.

- **Core Education Courses**

SMED 101. STEP 1: INTRODUCTION TO INQUIRY-BASED APPROACHES TOTEACHING. (3 hrs) 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.

(3 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.

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**

CHEM 120: COLLEGE CHEMISTRY I (3) – The first half of the standard year-long general chemistry course sequence for science majors and minors.

CHEM 121: LAB COLLEGE CHEMISTRY I (2) – Laboratory to accompany CHEM 120. 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) – A continuation of the standard year long general chemistry course sequence for science majors and minors.

CHEM 223: LAB COLLEGE CHEM II (2) – Laboratory to accompany CHEM 222. Pre-lab lecture and laboratory meet for four hours per week.

CHEM 330: QUANTITATIVE ANALYSIS (5) – A study of the common techniques and theory of gravimetric, volumetric, electrochemical, and optical methods of analysis. Lecture is 3 hours. Laboratory is 2 hours.

CHEM 340/341: ORGANIC CHEMISTRY (3/2) – The first half of the standard one-year course for chemistry majors. Discussion includes structure of organic molecules, mechanisms, and preparations. Lecture is 3 hours. Laboratory is 2 hours.

CHEM 320: PRIN INORGANIC CHEMISTRY (3) – A treatment of the usual topics in theoretical inorganic chemistry presented at a level not requiring calculus.

CHEM 450/451: PHYSICAL CHEMISTRY (3/2) – A study of the chemical principles involved in thermodynamics, kinetics, equilibrium, surface phenomena, macromolecules, molecular structure and other selected topics using biological examples. Lecture is three hours. Laboratory is two hours.

CHEM 446: BIOCHEMISTRY (3) – A study of biochemical compounds and their role in intermediary metabolism. Special topics include biochemical energetics and coenzyme mechanisms.

CHEM 447: LAB BIOCHEMISTRY (2) – A basic laboratory study involving selected experiments which illustrate biochemical principles including separation, identification and chemical properties of carbohydrates, lipids, proteins and enzymes.

- **Supporting Courses**

GEOL 111. THE EARTH. (3) The study of Earth including rocks, mineral resources, energy, soils, surface geologic processes, earthquakes and Earth's interior, global tectonics, hydrology and environmental geology. Students electing to meet their general education laboratory requirement through GEOL 113 must simultaneously enroll in the GEOL 111 lecture course. Laboratory is required for Geology majors, minors and some prospective science teachers but is optional for most others. Colonnade E-NS | NS

GEOL 113. THE EARTH LABORATORY. (1) Prerequisites/corequisites: GEOL 111 or GEOG/GEOL 103. Laboratory work designed to accompany GEOL 111. Minerals, rocks, topographic maps, geologic maps, and aerial photographs are studied. This laboratory is required for Geology majors, minors and some prospective science teachers, but is optional for most others. Course Fee | Colonnade E-SL | S

MATH 136. CALCULUS I. (4) A course in one-variable calculus including topics from analytic geometry. Limits, derivatives, integration, and applications of polynomial, rational, trigonometric and transcendental functions. Includes lecture and recitation. Colonnade F-QR | QR

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) Corequisite: PHYS 332. Required for students enrolled in 332. Students perform physics experiments in electricity, magnetism and optics. Course Fee

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
Total Hours	200											

Note: Memorandums of Agreement with P-12 school partners are located under the CAEP Standard 2 link: <http://www.wku.edu/cebs/caep/>.

- 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	SMED 340
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

*Assessments are theoretically aligned to standards; however, results cannot be disaggregated into distinct standards for reporting and analysis.

4. CURRICULUM CONTRACT:**CURRICULUM CONTRACT****Undergraduate Degree Program – B.S., Chemistry (Reference #623)****B.S., Science and Math Education (Reference #774)****Leading to Initial Teacher Certification (Rank III) in Secondary Chemistry Education, Grades 8-12****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—34 hours		Required Courses Chemistry Major – 33 hours	
SMED 101 – Step 1	3 hrs.	CHEM 120 – College Chemistry I	3 hrs.
SMED 102 – Step 2	3 hrs.	CHEM 121 – Lab College Chemistry I	2 hrs.
SMED 310 – Knowing & Learning	3 hrs.	CHEM 222 – College Chemistry II	3 hrs.
SMED 320 – Classroom Interactions	3 hrs.	CHEM 223 – Lab College Chemistry II	2 hrs.
SMED 340 – Perspectives	3 hrs.	CHEM 330 – Quantitative Analysis	5 hrs.
SMED 360 – Research Methods	3 hrs.	CHEM 314 – Intro Organic Chemistry	5 hrs.
SMED 470 – Project-based Instruction	3 hrs.	CHEM 320 – Prin Inorganic Chemistry	3 hrs.
SMED 489 – Student Teaching Seminar	3 hrs.	CHEM 450 – Physical Chemistry I	3 hrs.
SEC 490 – Student Teaching	10 hrs.	CHEM 451 – Physical Chemistry I Lab	2 hrs.
		CHEM 446 - Biochemistry	3 hrs.
		CHEM 447 – Lab Biochemistry	2 hrs.
Colonnade Plan Component—39 hours		Support Courses – 16 hours	
See WKU catalog website for guidance in selecting appropriate coursework to meet WKU's Colonnade Plan requirements or go to: https://www.wku.edu/colonnade/colonnaderequirements.php		MATH 136	4 hrs.
		PHYS 231 – Physics/Biophysics I	3 hrs.
		PHYS 232 – Lab Physics/Biophysics I	1 hr.
		PHYS 233 – Lab Physics/Biophysics II	1 hr.
		PHYS 332 – Physics/Biophysics II	3 hrs.
		GEOL 111 – The Earth	3 hrs.
		GEOL 113 – Lab The Earth	1 hr.

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			
<ul style="list-style-type: none"> • Cumulative GPA • CASE test scores • Application to include: <ul style="list-style-type: none"> – 3 faculty recommendations – Physical (including TB test) – KY criminal background check – Signed KY Code of Ethics 	<ul style="list-style-type: none"> • 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			
<ul style="list-style-type: none"> • GPAs and at least 90+ hours completed (including 75% of content courses) • Completion of required field hours • Completion of Key Assessments • Dispositions scores 	<ul style="list-style-type: none"> • 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			
<ul style="list-style-type: none"> • Candidate student teaching • Teacher Work Sample scores • Dispositions scores 	<ul style="list-style-type: none"> • 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 Division of Professional Learning and Assessment 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:

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

Signature

Date

Signature

Date

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