Chemistry

ePortfolio Guide

Missouri State University

Missouri State Portfolio Guide
MoSPE & Conceptual Framework Standards

QUALITY INDICATORS	PERFORMANCE INDICATORS
MoSPE 1: Content Knowledge Aligned with Appropriate Instruction. The teacher understands the central concepts, structures and tools of inquiry of the discipline(s) and creates learning experiences that make aspects of subject matter meaningful and engaging for students. CONCEPTUAL FRAMEWORK 1. Foundations and Content Integration 2. Subject Matter Knowledge	1.1 Demonstrates basic content knowledge as well as academic language of disciplines. 1.2 Demonstrates an awareness of teaching methodologies used to engage students in subject matter. 1.3 Utilizes disciplinary methods of inquiry and research. 1.4 Demonstrates an understanding of what constitutes an interdisciplinary lesson. 1.5 Demonstrates an understanding of cultural diversity and the potential for bias in teaching.
MoSPE 2: Student, Learning Growth and Development. The teacher understands how students learn, develop, and differ in their approaches to learning. The teacher provides learning opportunities that are adapted to diverse learners and that support the intellectual, social, and personal development of all students. CONCEPTUAL FRAMEWORK 3. Learning and Development 9. Diversity	2.1 Demonstrates a basic knowledge of principles of child/adolescent development. 2.2 Demonstrates the ability to set short and long-term goals, organize, implement, and selfreflect. 2.3 Demonstrates a basic knowledge of theories of learning. 2.4 Demonstrates an understanding that students differ in their approaches to learning. 2.5 Explains how students' prior experiences, multiple intelligences, strengths, and needs to positively impact learning. 2.6 Explains how instruction is connected to students' prior experiences, family, culture, and community.

MoSPE 3: Curriculum Implementation. The teacher recognizes the importance of long range planning and curriculum development. The teacher develops, implements, and evaluates curriculum based upon student, district and state standards data. CONCEPTUAL FRAMEWORK 6. Professional Skills	3.1 Demonstrates an understanding of curriculum, instructional alignment, and national and state standards. 3.2 Demonstrates an understanding of the importance of using appropriate strategies, materials, and technology based on the needs of diverse learners 3.3 Demonstrates an understanding of the importance of differentiated instruction and short and long-term instructional goal planning to meet student needs.
MoSPE 4: Critical Thinking. The teacher uses a variety of instructional strategies and resources to encourage students' development and critical thinking, problem solving, and performance skills. CONCEPTUAL FRAMEWORK 6. Professional Skills	4.1 Demonstrates a general knowledge of various types of instructional strategies to promote critical thinking. 4.2 Demonstrates an understanding of how using current instructional resources benefits the teaching and learning process. 4.3 Demonstrates an understanding of the importance of using cooperative learning strategies for effective student engagement.
MoSPE 5: Positive Classroom Environment. The teacher uses an understanding of individual/group motivation and behavior to create a learning environment that encourages active engagement in learning, positive social interaction and self-motivation. CONCEPTUAL FRAMEWORK 6. Professional Skills	5.1 Recognizes principles of classroom management, motivation, and engagement. 5.2 Recognizes the importance of managing time, space, transitions, and activities. 5.3 Recognizes the influence of classroom, school, and community culture on student relationships and the impact on the classroom environment and learning.

MoSPE 6: Effective Communication. The teacher models effective verbal, nonverbal, and media communication techniques with students, colleagues and families to foster active inquiry, collaboration, and supportive interaction in the classroom. CONCEPTUAL FRAMEWORK 6. Professional Skills	6.1 Demonstrates effective verbal and nonverbal communication techniques. 6.2 Recognizes sensitivity to differences in culture, gender, intellectual and physical ability in classroom communication. 6.3 Identifies the importance of facilitating learner expression in speaking, writing, listening, and other media. 6.4 Develops skills in using a variety of media communication tools.
MoSPE 7: Student Assessment and Data Analysis The teacher understands and uses formative and summative assessment strategies to assess the learner's progress and uses both classroom and standardized assessment data to plan ongoing instruction. The teacher monitors the performance of each student and devises instruction to enable students to grow and develop, making adequate academic progress. CONCEPTUAL FRAMEWORK 7. Assessment Skills	7.1 Demonstrates the importance of using formative and summative assessment strategies. 7.2 Recognizes the importance of using assessment data to guide instructional approaches and learning strategies. 7.3 Recognizes the importance of self and peer assessment, differences in formats, and can set their own learning goals. 7.4 Recognizes the importance of gathering assessment data to show the effectiveness of instruction on individual/class learning. 7.5 Recognizes the importance of maintaining confidentiality of student records and communicating student progress to students, families, colleagues, and administrators. 7.6 Recognizes the importance of the collaborative data analysis process.

MoSPE 8: Professional Practice. The teacher is a reflective practitioner who continually assesses the effects of choices and actions on others. The teacher actively seeks out opportunities to grow professionally in order to improve learning for all students. CONCEPTUAL FRAMEWORK 4. Reflective and Inquiry Skills 8. Dispositions	8.1 Articulates understanding of the importance of reflective practice and continual professional growth. 8.2 Articulates the importance of regular participation in professional learning opportunities. 8.3 Recognizes ethical practices and the influence of district policies and school procedures on professional practice.
MoSPE 9: Professional Collaboration. The teacher has effective working relationships with students, families, school colleagues and community members. CONCEPTUAL FRAMEWORK 10. Collaboration and Leadership	9.1 Reflects on the importance of fostering appropriate relationships with peers and school personnel. 9.2 Recognizes the importance of accessing basic services available in the school and community to support students and their learning. 9.3 Reflects on the importance of developing relationships with students, families, and communities in support of student learning.

The beginning (preservice) **Unified Science 9-12: Chemistry** teacher will demonstrate knowledge of and/or competency in the following areas of study:

1. Unifying Concepts **(1997 SSC: 1.2, 1.4; NSTA [2003]: C.1; NSES: UCP-1-5)**	1. Multiple ways our perceptions of the world are organized and how we use systems to organize the studies and knowledge of science. 2. Nature of scientific evidence and the use of models for explanation. 3. Measurement as a way of knowing and organizing observations of constancy and change. 4. Evolution of natural systems and factors that result in evolution or equilibrium. 5. Interrelationships of form, function, and behaviors in living and nonliving systems.
2. Nature of Science **(1997 SSC: 1.3, 1.5; NSTA [2003]: 2.a, 2.b, 4; CR V.2.a; NSES: E-G1, G2, G3; NSES: H-G1, G2, G3; S 1-8; S 1-8; Praxis 0245: VI)**	1. The historical and cultural development of science and the evolution of knowledge across the four disciplines.. 2. The philosophical tenets, assumptions, goals, and values that distinguish science from technology and from other ways of knowing the world. 3. Strategies for engaging high-school students successfully in studies of the nature of science including, when possible, the critical analysis of false or doubtful assertions made in the name of science.
3. Inquiry **(1997 SSC: 1.1, 1.4; CR: see note RE: Methods course; 1.1; NSTA [2003] 3; NSES: H-A1, A2; S 1, 2, 7-8; Praxis 0245: VI); NSES (NRC, 2000)**	1. The processes, tenets, and assumptions of multiple methods of inquiry leading to scientific knowledge. 2. Strategies for engaging high school students in developmentally appropriate inquiries that require them to develop concepts and relationships from their observations, data, and inferences in a scientific manner. 3. Engage scientifically oriented questions, give priority to evidence, formulate explanations from evidence, connect explanations to scientific knowledge, and communicate and justify explanations to others.
4. Issues **(1997 SSC: 1.3, 1.6; NSTA [2003] 4; NSES: M-F1, F2, F3, F4, F5, F6; S 1, 3-5;** **NSES: H-F1, F2, F3, F4, F5, F6; S 1, 3-5;** **NSES: H-E1, E2, E3; Praxis 0245: VI)**	1. Understanding of socially important global and local issues related to science and technology across the four disciplines, as well as processes used to analyze and make decisions on such issues. 2. Strategies for engaging students successfully in the analysis of problems, including considerations of risks, costs, and benefits of possible solutions; and relating these issues to the knowledge, goals and values of the students. 3. Career opportunities in the life and physical sciences.

5. Safety and Welfare **(1997 SSC: 1.7; CR: see DESE CR note RE: Methods course; NSTA [2003] 9.b, 9.c, 9.a; Praxis 0245: VII)**	1. Handle, label, store, & dispose of chemicals, electrical equipment, & scientific apparatuses & take actions to prevent or report emergencies, including, but not limited to, general first aid as it relates to incidents in the science classroom or laboratory. 2. Understand liability, ethics, and negligence, especially as applied to science teaching and take action to prevent potential problems, including proper treatment of organisms.
6. Chemistry Core Competencies **(1997 SSC: 2.1-.8; NSTA C.3.a; CR: 2.c; NSES: H-B1, B2, B3, B5, B6; S 1, 2, 7-8; Praxis 0245: II, III, IV, V)**	1. Fundamental structures of atoms and molecules. 2. Basic principles of ionic, covalent, and metallic bonding. 3. Physical and chemical properties and classification of elements including periodicity. 4. Chemical kinetics and thermodynamics. 5. Principles of electrochemistry. 6. Mole concept, stoichiometry, and laws of composition. 7. Transition elements and coordination compounds. 8. Acids and bases; oxidation-reduction chemistry; solutions; chemical equilibrium; acid base titration/pH/; instrumentation. 9. Fundamental biochemistry. 10. Functional and polyfunctional group chemistry. 11. Environmental and atmospheric chemistry. 12. Fundamental processes of investigating in chemistry, including laboratory skills. 13. Applications of chemistry in personal and community health and environmental quality in Missouri, the U.S., and the world.
7. Biology Core Competencies **(1997 SSC 4.1-.7, 5.1-.6; CR: V.2.b, .e, .f; NSTA [2003] C.2.a; NSES: H-C1, C2, C3,** **C4, C5, C6; S 3, 4, 7-8; S 3, 4, 7-8; ETS 0245: not addressed by 0245)**	1. Life processes in living systems including organization of matter and energy. 2. Similarities and differences among animals, plants, fungi, microorganisms, and viruses. 3. Principles and practices of biological classification. 4. Scientific theory and principles of biological evolution. 5. Ecological systems, biomes, and ecosystem dynamics, including the interrelationships and dependencies of organisms with each other and their environments. 6. Population dynamics and the impact of a population on its environment. 7. General concepts of genetics and heredity (e.g., DNA/RNA, protein synthesis, mutations, adaptations). 8. Organization and functions of cells and multicellular systems. 9. Behavior of organisms and their relationships to social systems. 10. Regulation of biological systems including homeostatic mechanisms. 11. Fundamental processes of modeling and investigating in the biological sciences, including laboratory skills. 12. Applications of biology in environmental quality and in personal and community health.

8. Earth and Space Science Core Competencies (1997 SSC: 6.1-.7, 7.1-.5; CR: V.2.e; NSTA [2003] C.4.a; NSES: H-D1, D2, D3, D4; S 5-8; S 5-8; ETS 0245: I]	1. Characteristics of and interactions among land, atmosphere, and ocean systems on Earth. 2. Properties, measurement, and classification of Earth materials. 3. Local and global changes in the Earth including land formation and erosion. 4. Local and global geochemical and biogeochemical cycles including biotic and abiotic systems. 5. Local and global energy flow and transformation in Earth systems. 6. Local and global hydrological features of the Earth. 7. Local and global patterns and changes in the atmosphere, weather, and climate. 8. Origin, evolution, and planetary behaviors of Earth. 9. Origin, evolution, and properties of the universe. 10. Fundamental processes of investigating in the Earth and space sciences, including laboratory skills. 11. Sources and limits of natural resources in Missouri, the U.S., and the world. 12. Applications of Earth and space sciences to environmental quality and to personal and community health and welfare (e.g., natural disasters, global climate change, acid rain, etc.) in Missouri, the U.S., and the world.
9. Physics Core Competencies (1997 SSC: 3.1-.7; CR: V.2.d; NSTA [2003]: C.5; NSES: H-B1, B2, B3, B5, B6; S 1, 2, 7-8; Praxis: ETS 0245: I, II, IV))	1. Energy, work, and power. 2. Motion, major forces, and momentum. 3. Newtonian principles and laws including engineering applications. 4. Conservation of mass, momentum, energy, and charge. 5. Physical properties of matter. 6. Kinetic-molecular motion and atomic models. 7. Radioactivity, nuclear reactors, fission, and fusion. 8. Wave theory, sound, light, the electromagnetic spectrum and optics. 9. Electricity and magnetism 10. Fundamental processes of investigating in physics, including laboratory skills.. 11. Applications of physics in environmental quality and to personal and community health in Missouri, the U.S., and the world.

10. Chemistry Advanced Competencies (1997 SSC: 2.1-.8; NSTA C.3.b; CR: 2.c, 2.g; NSES: H-C1, C2, C5, C6; S 3, 4, 7-8; Praxis 0245: II, III, IV, V)	1. Molecular orbital theory, aromaticity, metallic and ionic structures, and correlation to properties of matter. 2. Superconductors and principles of metallurgy. 3. Advanced concepts of chemical kinetics, and thermodynamics. 4. Lewis adducts and coordination compounds. 5. Solutions, colloids, and colligative properties. 6. Major biological compounds and natural products. 7. Solvent system concepts including non-aqueous solvents. 8. Chemical reactivity and molecular structure including electronic and steric effects. 9. Organic synthesis and organic reaction mechanisms. 10. Energy flow through chemical systems. 11. Issues related to chemistry including ground water pollution, disposal of plastics, and development of alternative fuels. 12. Historical development and perspectives in chemistry including contributions of significant figures and underrepresented groups, and the evolution of theories in chemistry. 13. How to design, conduct, and report research in chemistry.14. Applications of chemistry and chemical technology in society, business, industry, and health fields in Missouri, the U.S., and the world. 15. Systematic nomenclature of ionic and molecular compounds, including acids, and of organic compounds, including their functional groups.
11. Chemistry Supporting Competencies (1997 SSC: 4.1-.7; NSTA C.3.C; CR: 2.b, 2.d, 2.e; NSES: H-C1, C2, C5, C6; S 3, 4, 7-8; NSES: H-D1, D2, D3, D4; S 5-8; S 58; Praxis 0245: VII)	1. Biology, including molecular biology, bioenergetics, and ecology. 2. Earth science, including geochemistry, cycles of matter, and energetics of Earth systems. 3. Physics, including energy, stellar evolution, properties and functions of waves, motions and forces, electricity, and magnetism. 4. Mathematics, including statistics, probability, calculus and differential equations.

The Professional Preparation Portfolio

Successful completion of a Professional Preparation Portfolio is required of all teacher education candidates at Missouri State in order to be recommended for initial certification to teach. This portfolio is a graphic anthology of a student's progress and performance in all coursework, practicum placements and student teaching experiences. The Professional Preparation Portfolio is also a medium by which the academic programs are evaluated for accreditation by the Missouri Department of Elementary and Secondary Education and the National Council for the Accreditation of Teacher Education.

Teacher education students will receive guidance throughout their program from the instructors of their courses to help answer questions and maintain quality of the portfolio. There are three checkpoints scheduled throughout the sequence of courses taken in the teacher education program. The checkpoints are individual conferences held between students and instructors to assure that everything is in order and progressing satisfactorily toward meeting the Missouri Standards for Teacher Education Program (MoSTEP) quality indicators and subject area competencies.

The first checkpoint occurs in SEC 302. PED 200, or MUS 200. The second will occur during the special methods courses or designated point in the degree program. The third and final checkpoint occurs during the student teaching semester. At that time the portfolio will be reviewed to determine if there is sufficient evidence to meet MoSTEP quality indicators and subject area competencies.

Portfolio Checkpoint 1: ELE 302/SEC 302/PED 200/MUS 200*

These artifacts are required and must be included within the portfolio at checkpoint 1:

- Professional Resume
- Clinical Placements Log
- Artifacts with cover sheets as assigned – minimum of lesson plan and appropriate artifact cover sheet Evaluation of uploaded materials by faculty

Portfolio Checkpoint 2: Special Methods Courses or Designated Point in Program

A summary of general expectations for Portfolio Checkpoint 2 follows:

- Artifacts and artifact cover sheets required by the specialty area that reflect knowledge, skills and professional dispositions aligned with standards
- Professional Resume further developed
- Clinical Placement form completed to reflect additional experiences and outcomes Educational Philosophy

Portfolio Checkpoint 3: Supervised Student Teaching

Artifacts may be required and reviewed by the specialty area faculty, University Student Teaching Supervisor and cooperating teacher. A summary of expected content follows:

- Additional artifacts and artifact cover sheets as required in order to meet MoSTEP quality indicators and subject area competencies
- Professional resume completed
- Clinical placement form completed to reflect culminating experiences and outcomes
- Complete section IV of your portfolio (Student Teaching Evaluations)

For additional help log on to the Missouri State PEU Website at http://www.missouristate.edu/peu/

*Students must consult with their departmental advisors concerning special requirements for artifact cover sheets. Limited examples follow.

Appendix 1: Portfolio Content and Requirements

- Access the portfolio website for further details at http://www.missouristate.edu/peu/student_portfolios/
- Candidates (students) starting the program in fall 2001 semester will be expected to develop the portfolio in an electronic format (web-based and/or zip disk or CD).
- There are four sections to the portfolio as noted below.
- Candidates that wish to maintain a hard copy of the portfolio, along with a copy in an electronic format, may purchase tabs that correspond to the following section at the University bookstore (Spring, 2002).
- The number and type of artifacts will correspond to the program assessment plan. See program faculty for guidance.
- Candidates should record progress toward meeting professional standards on the Portfolio Guide (see downloadable forms).

Portfolio Sections

Section I. Introduction

Section I contains the professional education candidate's:

- Educational Philosophy
- Resume'
- Log of Clinical Placements assigned during the program (downloadable form)

Section II. Professional Practice

Section II includes artifacts that represent performances aligned to the Conceptual Framework (CF) MoSTEP and specialty area standards.

- Download a copy of the Portfolio Guide (replaces the old Table of Contents) specific to your area of study. The Portfolio Guide should be kept in Section II of the portfolio with artifacts reflecting the required standards placed after the guide. Candidates are expected to monitor progress toward standards on the Portfolio Guide (downloadable form).
- Artifacts that reflect the Missouri State (CF) Learner Outcomes, the MoSTEP Standards and the specialty area standards will be placed in Section II of the portfolio. Artifacts must be accompanied by anArtifact Cover Sheet that documents the nature of the project as well as performances related to standards. (See downloadable forms to access the Artifact Cover Sheet and corresponding Directions for the Artifact Cover Sheet.

Section III. Showcase

Section III is the student Showcase Section. This is optional for students who elect to include items that will further illustrate their experiences in the professional education program as well as showcase mastery of professional standards and the Conceptual Framework general outcomes.

Section IV. Field Evaluations

This section should include practicum and student teaching field evaluations. See your program faculty for guidance regarding practicum materials and evaluations. For student teaching, include the evaluation of the cooperating teacher and the University supervisor of all placements in the student teaching semester.

APPENDIX 2: ABOUT THIS ARTIFACT - DIRECTIONS FOR THE ARTIFACT COVER SHEET

Cover sheets should be attached to artifacts within the Professional Preparation Portfolio as directed by program faculty. The purpose of the cover sheet is to ensure reflection and review regarding performances related to the Missouri State Professional Education Unit (PEU) Conceptual Framework (CF), the MoSTEP standards and your Specialty Area standards. Information provided on the cover sheet yields evidence of your progress in meeting professional education standards. . Directions for completing the sections of the cover sheet follow.

- "Title of artifact": Typically, an artifact will have a designated title. If it does not, provide a brief description or name.
- "Date this artifact was collected": When was the item completed, graded, or made available for inclusion in the portfolio? If necessary, give a more general time, e.g. "Fall Semester 2001."
- "Course or experience where the artifact was developed": Provide both the course code and course title. If the item was not developed for a course, describe the experience corresponding to development.
- "Quality indicators addressed by this artifact": Identify the quality indicators/learner outcomes that are represented within the artifact. Example:

  CF (add learner outcome and #) MoSTEP (add # and description) Specialty Area: Science Education (add # and description)

  Since there is commonality between the CF, the MoSTEP, and the Specialty Area Standards, it is typically appropriate to reference all three sets of standards on the cover sheet. See your program faculty for guidance if you have questions.
- "Reflective Narrative": This section includes a summary of candidate performances that correspond to the quality indicator and learner outcomes listed. Use the performance indicators corresponding to each quality indicator as a guide. This section requires analysis and synthesis of performances related to standards and should be written as a narrative summary rather than a list. The narrative should document that you have demonstrated performances consistent with the CF Learner Outcomes, the MoSTEP and the Specialty Area standards noted above.

Examples of completed Artifact Cover Sheets follow; however, you must seek guidance from program faculty regarding requirements specific to your area of study.

ABOUT THIS ARTIFACT

Student Name: _____

Major/Certification Area: _____

Title of the Artifact: _____

Date this artifact was collected: _____

Course or experience where artifact was developed: _____

Quality indicators addressed by this artifact - Include MoSTEP and Specialty Area Indicator(s) as well as PEU CF Learner Outcome(s) as appropriate:

Reflective narrative – How this artifact reflects performances specific to MoSTEP, PEU CF Learner Outcomes and/or Specialty Area performance indicators as appropriate. What do I know and what am I able to do?

Appendix 3: CF General Learning Outcomes

The curricula of professional education programs at Southwest Missouri State University reflect our commitment to these beliefs. Further, they reflect and are aligned with the professional standards specified by state, national and professional accreditation organizations. Our initial and advanced programs are designed to develop candidate knowledge, skills, and dispositions associated with successful professional educational practice.

Missouri State professional education graduates will demonstrate competence in:

1. Foundations: knowledge of the historical development of the profession, and foundational issues and arguments underlying its practices, as well as understanding of the importance of integrated learning across disciplines.
2. Subject Matter: knowledge of subject matter discipline content and the ability to integrate content with pedagogy appropriate to the candidate's field of study.
3. Learning and Development: knowledge of human development and motivation, theories of learning, pedagogy and assessment.
4. Reflective skills: communication skills, critical and creative thinking abilities and other skills crucial to reflective decision-making.
5. Technology: knowledge and skills in the use of technology appropriate to the candidate's field of study.
6. Professional Skills: the practical abilities to implement the skills, techniques, and strategies associated with student learning and development in the educational context in which they practice.
7. Assessment Skills: the skills to conduct valid and reliable assessments of their students' learning, and use that assessment to improve learning and development for their students.
8. Dispositions: the intellectual, social, ethical, and other personal attributes and beliefs previously ascribed to reflective decision-makers in a variety of professional settings, including a commitment to their own lifelong learning and professional development.
9. Diversity: the ability to skillfully facilitate and promote the learning of all students, including those from diverse cultural, racial and economic backgrounds, and those with disabilities.
10. Collaboration and Leadership: the ability and skills to foster and maintain collaborative, empowering relationships with other professionals within schools and the community.