

Rule 24 Matrix
Form Revised by NDE: March 2007
Matrix Reviewed by WSC: May 2009 – Dr. Sally Harms
Table of Alignment of Standards and Assessments

Endorsement: Chemistry
Total Hours Required by Rule 24: 36

Grade Levels: 7-12
Program Hours Required by Institution: 39-40

Endorsement Type: Subject
Name of Institution: Wayne State College

Endorsement Program Requirements: Nebraska teacher education institutions offering this endorsement program must have on file, within the institution, a plan which identifies the courses and the course completion requirements which the institution utilizes to grant credit toward completion of this endorsement.

<u>Standard/Description</u>			Candidate Proficiencies				
Course #, Title, and Credits	Course Assessment(s)	Key Program Assessment(s)	Content Knowledge	Pedagogical Knowledge	Skills	Dispositions	P-12 Student Learning
006.09D Certification Endorsement Requirements: This endorsement shall require a minimum of 36 semester hours of laboratory based courses in the natural sciences (biology, chemistry, earth science, and physics), of which 24 semester hours must be in chemistry and a minimum of 12 semester hours of laboratory based courses among the remaining three natural sciences areas. A laboratory-based course provides activity-based, hands-on experience for all students. Laboratory activities shall be designed to allow students to develop scientific skills and processes, discover and construct science concepts, and allow for the application of the concept to the real lives of students.							
Required Core Courses for all Chemistry Majors:							
BIO 110: Biology Concepts (4) – Block 2 General Education	Final Exam	GPA	X		X		
CHE 106: General Chemistry I (4)	Final Exam	GPA	X		X		
CHE 107: General Chemistry II (4)	Final Exam	GPA	X		X		
CHE 305 Analytical Chemistry (4)	Final Exam	GPA	X		X		
PHY 201: General Physics I (3) OR PHY 301: University Physics I (4)	Final Exam	GPA	X		X		
PHY 321: Physics Laboratory I (1)	Final Exam	GPA	X		X		
Chemistry Education Concentration:							
CHE 208: Intro to Organic Chemistry (4) OR CHE 314: Organic Chemistry (4)	Final Exam	GPA	X		X		
CHE 326 Biochemistry I (4)	Final Exam	GPA	X		X		
CHE 393: Laboratory Techniques (4)	Final Exam	GPA	X		X		
CHE 456: Physical Chemistry I (3)	Final Exam	GPA	X		X		
CHE 493: Laboratory Management (1)	Final Exam	GPA	X		X		
EAS 110: Intro to Meteorology (4) OR EAS 120: Intro to Geology (4)	Final Exam	GPA	X		X		
BIO, CHE, NAT, PHY upper-level elective courses (6)	Final Exam	GPA	X		X		
Chemistry subject endorsees are required to take MAT 130 Pre-Calculus OR both MAT 121 College Algebra and MAT 122 Applied Trigonometry to satisfy Block 2 of General Education.	Course Grade		X				
Professional Education:							
EDU 409: Science Content Area Methods and Materials (2)	Semester Unit Project	GPA	X	X	X	X	
EDU 410: Student Teaching (12)	Student Teaching Evaluation	GPA	X	X	X	X	X

Standard/Description							
A. Demonstrate knowledge and understanding of and be able to teach the concepts, skills and processes of science as defined in the Nebraska Content Standards for eighth and twelfth grades. Preparation for subject endorsements will not include the same level of depth of understanding as the Natural Science endorsement. Demonstrate the appropriate depth of understanding of the subject area endorsement.			Candidate Proficiencies				
Course #, Title, and Credits	Course Assessment(s)	Key Program Assessment(s)	Content Knowledge	Pedagogical Knowledge	Skills	Dispositions	P-12 Student Learning
BIO 110: Biology Concepts (4)	Final Exam	GPA	X		X		
CHE 106: General Chemistry I (4)	Final Exam	GPA	X		X		
CHE 107: General Chemistry II (4)	Final Exam	GPA	X		X		
CHE 208: Intro to Organic Chemistry (4) OR CHE 314: Organic Chemistry (4)	Final Exam	GPA	X		X		
CHE 393: Laboratory Techniques (1)	Final Exam	GPA	X		X		
EAS 110: Intro to Meteorology (4) OR EAS 120: Intro to Geology (4)	Final Exam	GPA	X		X		
PHY 201: General Physics I (3) OR PHY 301: University Physics (4)	Final Exam	GPA	X		X		
PHY 321: Physics Lab I (1)	Final Exam	GPA	X		X		
EDU 409: Content Area Methods and Materials (2)	Semester Unit Project	GPA	X	X	X	X	
EDU 410 : Student Teaching (12)	Student teaching evaluations	GPA	X	X	X	X	X

Standard/Description							
B. Design and manage safe and supportive learning environments reflecting high expectations for the success of all students, including being able to: 1. Manage physical spaces within which science learning occurs; 2. Demonstrate proper treatment and ethical use of living organisms; and 3. Demonstrate safety in all areas related to science instruction;			Candidate Proficiencies				
Course #, Title, and Credits	Course Assessment(s)	Key Program Assessment(s)	Content Knowledge	Pedagogical Knowledge	Skills	Dispositions	P-12 Student Learning
CHE: 393 Laboratory Techniques (1)	Performance Based Lab	GPA	X		X	X	
CHE 493: Laboratory Management (1-2)	Performance Based Lab	GPA	X		X	X	
BIO 110: Biology Concepts (4)	Final Exam	GPA	X		X	X	
EDU 409: Content Area Materials & Methods (2)	Semester Unit Project	GPA	X	X	X	X	

Standard/Description							
C. Relate science to the community and to use human and institutional resources in the community to advance the education of their students in science, including being able to: 1. Utilize social and community support networks; 2. Relate science teaching and learning to the needs and values of the community; and 3. Involve people and institutions from the community in the teaching of science;			Candidate Proficiencies				
Course #, Title, and Credits	Course Assessment(s)	Key Program Assessment(s)	Content Knowledge	Pedagogical Knowledge	Skills	Dispositions	P-12 Student Learning
Electives: BIO, CHE, EAS, NAT, PHY upper-level (10)	Final Exam (for all)	GPA (for all)	X (for all)				
EDU 409: Content Area Materials & Methods (2)	Semester Unit Project	GPA	X	X	X	X	

Standard/Description							
D. Apply the unifying concepts and processes that help students think about and integrate a range of basic ideas which build an understanding of the natural world, including: <ol style="list-style-type: none"> 1. Systems, order and organization; 2. Evidence, models and explanation; 3. Change, constancy and measurement; 4. Evolution and equilibrium; and 5. Form and function; 			Candidate Proficiencies				
Course #, Title, and Credits	Course Assessment(s)	Key Program Assessment(s)	Content Knowledge	Pedagogical Knowledge	Skills	Dispositions	P-12 Student Learning
BIO 110: Biology Concepts (4)	Final Exam	GPA	X		X		
CHE 106: General Chemistry I (4)	Final Exam	GPA	X		X		
CHE 107: General Chemistry II (4)	Final Exam	GPA	X		X		
CHE 208: Intro to Organic Chemistry (4) OR CHE 314: Organic Chemistry (4)	Final Exam	GPA	X		X		
CHE 305: Analytical Chemistry (4)	Final Exam	GPA	X		X		
CHE 326: Biochemistry (4)	Final Exam	GPA	X		X		
CHE 456: Physical Chemistry I (4)	Final Exam	GPA	X		X		
EAS 110: Intro to Meteorology (4) OR EAS 120: Intro to Geology (4)	Final Exam	GPA	X		X		

Standard/Description							
E. Apply the processes of scientific inquiry, including the ability to: <ol style="list-style-type: none"> 1. Identify questions and concepts that guide scientific investigations; 2. Design and conduct scientific investigations; 3. Use appropriate tools and techniques to gather, analyze and interpret data; 4. Develop descriptions, explanations, predictions and models using evidence; 5. Think critically and logically to make relationships between evidence and explanation; 6. Recognize and analyze alternative explanations and models; 7. Communicate and defend a scientific argument; and 8. Understand the unique characteristics of scientific inquiry; 			Candidate Proficiencies				
Course #, Title, and Credits	Course Assessment(s)	Key Program Assessment(s)	Content Knowledge	Pedagogical Knowledge	Skills	Dispositions	P-12 Student Learning
BIO 110: Biology Concepts (4)	Final Exams & lab work	GPA	X		X		
CHE 305: Analytical Chemistry (4)	Final Exams & lab work	GPA	X		X		
PHY 201: General Physics I (3) OR PHY 301: University Physics I (4)	Final Exams & lab work	GPA	X		X		
PHY 321: Physics Laboratory I (1)	Final Exams & lab work	GPA	X		X		
Electives: BIO, CHE, NAT, PHY upper-level (5)	Final Exams & lab work	GPA	X		X		

Standard/Description							
F. Apply physical science facts, concepts, principles, theories and models, including: <ol style="list-style-type: none"> 1. Structure and properties of the atom; 2. Structure and properties of matter; 3. Chemical reactions; 4. Motions and forces; 5. Conservation of energy and increase in disorder; and 6. Interactions of energy and matter 			Candidate Proficiencies				

Course #, Title, and Credits	Course Assessment(s)	Key Program Assessment(s)	Content Knowledge	Pedagogical Knowledge	Skills	Dispositions	P-12 Student Learning
CHE 106: General Chemistry I (4)	Final Exam	GPA	X		X		
CHE 107: General Chemistry II (4)	Final Exam	GPA	X		X		
PHY 201: General Physics I (3) OR PHY 301: University Physics (4)	Final Exam	GPA	X		X		
PHY 202: General Physics II (3)	Final Exam	GPA	X		X		

Standard/Description								
G. Apply life science facts, concepts, principles, theories and models, including: <ol style="list-style-type: none"> 1. The cell; 2. Molecular basis of heredity; 3. Biological evolution; 4. Interdependence of organisms; 5. Matter, energy and organization in a human and other living systems; and 6. Behavior of organisms; 			Candidate Proficiencies					
Course #, Title, and Credits	Course Assessment(s)	Key Program Assessment(s)	Content Knowledge	Pedagogical Knowledge	Skills	Dispositions	P-12 Student Learning	
CHE 326: Biochemistry (4)	Final Exam	GPA	X		X			
BIO 110: Biology concepts (4)	Final Exam	GPA	X		X			

Standard/Description								
H. Apply earth and space science facts, concepts, principles, theories and models, including: <ol style="list-style-type: none"> 1. Structure of the earth system; 2. Earth's history; 3. Earth in the solar system; 4. Energy in the earth system; 5. Geochemical cycles; 6. Origin and evolution of the earth system; and 7. Origin and evolution of the universe; 			Candidate Proficiencies					
Course #, Title, and Credits	Course Assessment(s)	Key Program Assessment(s)	Content Knowledge	Pedagogical Knowledge	Skills	Dispositions	P-12 Student Learning	
EAS 110: Intro to Meteorology (4) OR EAS 120: Intro to Geology (4)	Final Exam	GPA	X		X			
BIO 110: Biology concepts (4)	Final Exam	GPA	X		X			
Electives: BIO, CHE, PHY, NAT upper-level (6)	Final Exam	GPA	X		X			

Standard/Description								
I. Establish connections between the natural and designed world, linking science and technology, including being able to: <ol style="list-style-type: none"> 1. Plan, create or modify, and evaluate a technological solution to a scientific problem; 2. Describe the relationship between science and technology, including the cyclical relationship for advancement; and 3. Demonstrate an understanding of the interdisciplinary nature of science as it approaches human problems, e.g., engineering, geophysics and biochemistry; 			Candidate Proficiencies					
Course #, Title, and Credits	Course Assessment(s)	Key Program Assessment(s)	Content Knowledge	Pedagogical Knowledge	Skills	Dispositions	P-12 Student Learning	
BIO 110: Biology concepts (4)	Final Exam	GPA	X		X			
CHE 326: Biochemistry (4)	Final Exam	GPA	X		X			

PHY 201: General Physics I (3) OR PHY 301: University Physics I (4)	Final Exam	GPA	X		X		
PHY 321: Physics Laboratory (1)	Final Exam	GPA	X		X		

Standard/Description							
J. Apply science concepts, principles, and processes to personal and social decision making, including: 1. Personal and community health; 2. Population growth; 3. Natural resources; 4. Environmental quality; 5. Natural and human-induced hazards; and 6. Science and technology in local, national, and global challenges.			Candidate Proficiencies				
Course #, Title, and Credits	Course Assessment(s)	Key Program Assessment(s)	Content Knowledge	Pedagogical Knowledge	Skills	Dispositions	P-12 Student Learning
BIO 110: Biology Concepts (4)	Final Exam	GPA	X		X		
CHE 326: Biochemistry (4)	Final Exam	GPA	X		X		
EAS 110: Intro to Meteorology (4) OR EAS 120: Intro to Geology (4)	Final Exam	GPA	X		X		
PHY 201: General Physics I (3) OR PHY 301: University Physics I (4)	Final Exam	GPA	X		X		
PHY 321: Physics Laboratory (1)	Final Exam	GPA	X		X		

Standard/Description							
K. Demonstrate an understanding of the history and nature of science, including: 1. An understanding of science as a human endeavor, including the ability to: a. Describe significant scientists, including individuals from both genders, and of different races and ethnic groups; b. Describe the societal, cultural, and personal beliefs that influence scientists; and c. Demonstrate the nature and practice of scientists, for example, ethical behaviors, peer review, truthful reporting, public disclosure; 2. The nature of scientific knowledge; and 3. The history of science.			Candidate Proficiencies				
Course #, Title, and Credits	Course Assessment(s)	Key Program Assessment(s)	Content Knowledge	Pedagogical Knowledge	Skills	Dispositions	P-12 Student Learning
BIO 110: Biology Concepts (4)	Final Exam	GPA	X		X		
CHE 106: General Chemistry I (4)	Final Exam	GPA	X		X		
CHE 107: General Chemistry II (4)	Final Exam	GPA	X		X		
CHE 208: Intro to Organic Chemistry (4) OR CHE 314 Organic Chemistry (4)	Final Exam	GPA	X		X		
CHE 326: Biochemistry (4)	Final Exam	GPA	X		X		
CHE 393: Laboratory Techniques (1)	Final Exam	GPA	X		X		
EAS 110 Intro to Meteorology (4) OR EAS 120: Intro to Geology (4)	Final Exam	GPA	X		X		
PHY 201: General Physics I (3) OR PHY 301: University Physics I(4)	Final Exam	GPA	X		X		
PHY 321: Physics Laboratory (1)	Final Exam	GPA	X		X		