



North Dakota Education Standards and Practices Board

Initial Program Report

Preparation of Chemistry Education Teachers (05-17)

COVER SHEET

1. Institution's Name: Mayville State University
2. Date Submitted: November 30, 2018
3. Preparer of this Report:
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4. CAEP/State Coordinator: Dr. Sarah Anderson
 - a. Phone: 701-788-4829
 - b. E-mail: sarah.anderson2@mayvillestate.edu
5. Name of Institution's program: Composite Chemistry Education
6. Grade levels for which candidates are being prepared: 5-12
7. Degree or award level (select one)
 - a. Initial
 - i. ☒ Baccalaureate
 - ii. ☐ Post Baccalaureate
8. Is this program offered at more than one site?
 - a. ☐ Yes
 - b. ☒ No
9. If your answer is yes to the above question, list the sites at which the program is offered:
10. Program report status (check one):
 - a. ☐ Initial Review
 - b. ☒ Continuing Review
 - c. ☐ Focused Visit



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SECTION I: CONTEXTUAL INFORMATION

1. Candidate Information

Directions: Provide three years of data on candidates enrolled* in the program and completing** the program, beginning with the most recent academic year for which numbers have been tabulated. Please report the data separately for the levels/tracks (e.g., baccalaureate, post-baccalaureate, alternate routes, master's, doctorate) being addressed in this report.

Program:

Academic Year	# of Candidates Enrolled in the Program	# of Program Completers
2017-2018	0	0
2016-2017	0	0
2015-2016	0	0

* Enrolled candidates are those formally admitted to the program as of the institution's official fall reporting date or as of October 15 of each academic year.

** Program completers are those candidates for whom a degree is conferred within the selected academic year. The academic year begins in the fall and concludes in the spring or summer of the following year depending upon whether candidates are granted degrees in the summer.

2. Curriculum Exhibit (Select 1)

- ☒ **Option 1:** Complete the Curriculum Exhibit Form below. **Include an electronic link to each syllabus for courses listed under the Teaching Specialty and the Professional Education columns.**
- ☐ **Option 2:** Upload the Program Status Sheet (must include general studies, specialty area, and professional education courses). **Include an electronic link to each syllabus for courses listed under the Teaching Specialty and the Professional Education columns.**

Curriculum Exhibit Form SFN 14381. Provides the opportunity for institutions to document the entire program including general studies, teaching specialty, and professional education.

- Curriculum exhibit forms are to be prepared for every basic and advanced program being brought forward for either initial or continuing approval by the Education Standards and Practices Board (ESPB).
- A separate sheet is to be completed for **each** program for which approval is requested. If more than one program is offered within an approval category, a separate sheet must be completed for each of those programs. For example, if both instrumental and vocal/choral music majors are offered, complete a separate sheet for each. Also, for example, a separate sheet must be completed for each of the science and social science majors.



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CURRICULUM EXHIBIT FORM BASIC PROGRAM EDUCATION STANDARDS AND PRACTICES BOARD SFN 14381 (05-17)



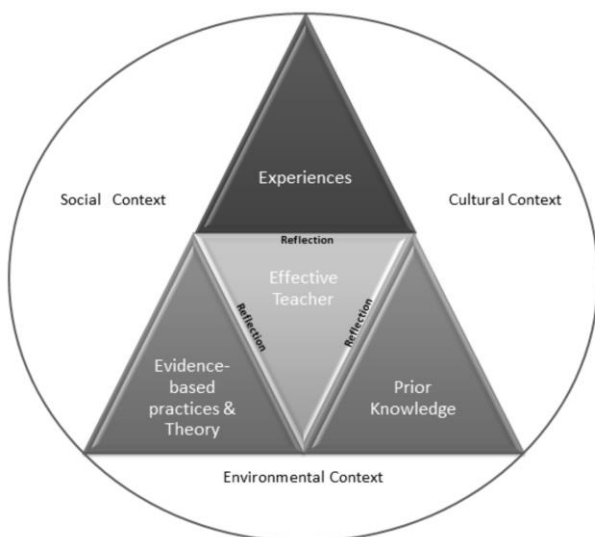
Institution: Mayville State University		Major: Chemistry Education
Total credits required for degree: 134		
General Studies	Teaching Specialty	Professional Education
Credits Required: 36	Credits Required: 53	Credits Required: 41
<u>Communication: 9 credits</u> ENGL 110 College Composition I (3) COMM 110 Fund of Public Speaking (3) ONE of the following: ENGL 120 College Composition II (3) ENGL 125 Business & Tech Writing (3) <u>Computer Information System: 1 credit</u> CIS 175 Information Literacy (1) <u>Humanities & Social Science: 15 credits</u> Humanities: minimum 6 credits Social Science: minimum 6 credits GEOG 103 Multicult Wrld, Gbl (3) PSYC 111 Intro. to Psychology (3) <u>Mathematics & Science: 11 credits</u> Mathematics: minimum 3 credits MATH 103 College Algebra (3) Science: minimum 4 credits (lab 1 credit) <u>Pre-Requisite Courses</u> CHEM 121/L General Chemistry I CHEM 122/122L General Chemistry II MATH 165 Calculus I	BIOL 150 General Biology I (3) BIOL 150L General Biology I Lab (1) BIOL 151 General Biology II (3) BIOL 151L General Biology II Lab (1) CHEM 330 Quant Analysis I (3) CHEM 330L Quant Analysis I Lab (1) CHEM 341 Organic Chem I (4) CHEM 341L Organic Chem I Lab (1) CHEM 360 Elements of Biochemistry (3) CHEM 360L Elem of BioChem Lab (1) CHEM 466 Survey of Physical Chem (3) CHEM 466L Survey of Physical Chem Lab (1) CHEM 470L Integrated Lab (1) GEOL 115 Introductory Geology (3) GEOL 115L Intro Geology Lab (1) MATH 323 Probability & Statistics (3) PHYS 110 Introductory Astronomy (3) PHYS 110L Intro Astronomy Lab (1) PHYS 211 College Physics I (3) PHYS 211L College Physics I Lab (1) PHYS 212 College Physics II (3) PHYS 212L College Physics II Lab (1) SCNC 480 Science Comprehensive (1) SCNC 322 Environmental Science (3) OR BIOL 332 General Ecology (3) <u>Biology Electives with lab (4)</u>	EDUC 250 Intro. To Education (3) EDUC 272 Educational Technology (2) EDUC 290 Theories of Learn. & Mgmt. (2) EDUC 380 Teaching ELLs (2) EDUC 381 Human Relations & Cultural Diversity (3) EDUC 390 Special Needs in an Inclusive Environment (3) EDUC 398 Sec. Educ. Field Experience (1) EDUC 400 Student Teaching (10) EDUC 401 Electronic Portfolio, Assessment, and Seminar (2) EDUC 401S Pre-Student Teaching Seminar (0) EDUC 422 Educational Assessment (2) EDUC 426 Reading In the Content Area (2) EDUC 480 General Methods for Secondary Educators (4) EDUC 480L Gen. Methods Field Exp. (1) EDUC 484 Secondary Methods for Science (2) PSYC 255 Child & Adolescent Psyc (3)
NOTE* A cumulative GPA of 2.75 must be earned in teaching major, minor, and professional education courses. A grade of "C" or better is required for all professional and methods education courses, excluding EDUC 250 where a "B" is required.		

ESPB does not advocate, permit, nor practice discrimination on the basis of sex, race, color, national origin, religion, age or disability as required by various state and federal laws.

3. **Descriptive Information about the Program:** Provide a one to two paragraph description to help reviewers understand your program (include information that describes how a student typically moves through the program from entry to exit).

The Mayville State Educator Preparation Program (EPP) is committed to creating a collaborative culture that frames the development of teacher candidates' knowledge, skills and dispositions through intentional, dynamic, integrated, and diverse teaching and learning experiences that support personalized, professional growth to positively impact learners. Our vision is to be a leader in educator preparation through transformative, relevant programming, learner-centered pedagogy, and partnerships that enable unique opportunities for quality experiences supportive to learning and leadership. We prepare highly qualified professionals to work with diverse populations in multiple environments.

The Reflective Experiential Teacher conceptual framework supports the inclusion of effective, research-based teaching strategies. It is based upon a belief that teacher candidates develop the ability to reflect on and apply current research findings, theoretical knowledge, and effective teaching practices.



The InTASC model core teaching standards outline what teachers should know and be able to do to ensure all learners reach the goal of being ready to enter college or the workforce in a global society. These standards outline the common principles and foundations of teaching practice that cut across all subject areas and grade levels and that are necessary to improve student achievement. The EPP uses the InTASC standards as a guide to measure teacher candidate proficiencies of the Reflective Experiential Teacher framework. The standards emphasize that candidates must demonstrate knowledge, performances and dispositions in four categories: the learner and learning, content, instructional practice, and professional responsibility. These create the program's Student Learning Outcomes (SLOs):

SLO 1 *Learner & Learning:* Teacher candidates understand diversity in learning and developmental processes and create supportive and safe learning environments for students to thrive.

SLO 2 *Content:* Teacher candidates understand subject matter deeply and flexibly so they can advance their students' learning, address misconceptions and connect ideas to everyday life.



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SLO 3 *Instructional Practice*: Teacher candidates will plan instruction, utilize effective instructional strategies and technologies, and continuously assess students for mastery and decision-making purposes.

SLO 4 *Professional Responsibility*: Teacher candidates take responsibility for student learning, positive relationships, their own professional growth, and the advancement of the profession.

Composite in Chemistry Education, B.S.ED.

This major provides students with the knowledge and skills essential for teaching science courses in secondary education with emphasis in chemistry. Students are provided with a broad base of knowledge, which permits certification in grades 5-12 in North Dakota. A minor is not required with this major. In addition to the core courses listed below the student must complete EDUC 398-Secondary Education Field Experience and EDUC 484-Secondary Methods for Science, EDUC 426-Reading in the Content Area and the secondary education core required for teacher certification.

Composite in Chemistry majors must complete 36 hours of essential studies. The following Essential Studies courses require a minimum grade of "C": COMM 110, ENGL 110, ENGL 120 or ENGL 125, GEOG 103, MATH 103, and PSYC 111. Additional requirements to the major include CHEM 121, CHEM 121L, CHEM 122, CHEM 122L, and MATH 165. These courses are pre-requisite courses to this major.

Chemistry Content Area Student Learning Outcomes:

SLO 1: Students will acquire a content knowledge commensurate with career goals.

SLO 2: Students will communicate scientific information both orally and in writing.

SLO 3: Students will apply quantitative or qualitative theories of science to a broad variety of chemical problems (including experiential component).

SLO 4: Students will construct and critically analyze scientific arguments.

SLO 5: Students will integrate technology appropriate to their major into their work products.

Admission to the EPP:

Students intending to earn a teaching certificate in conjunction with a degree must complete and submit a formal application to the Teacher Education Program. Students are informed of requirements by academic advisors, complete necessary Teacher Education forms in EDUC 250. Students who have not been admitted to the program have limited course offerings at or beyond the 300 level. Figure 1 shows how candidates progress through the program from admission to completion. An example program of study/sequence of courses (Figure 2) for a majority of students in secondary programs is also included.

Criteria for Admission:

1. Display satisfactory skills as demonstrated by successful completion of the following courses with these minimum grades:

- | | |
|-------------------------------------|---|
| a. ENGL 110- College Composition I | C |
| b. ENGL 120- College Composition II | C |

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c. or ENGL 125- Business/Technical Writing	C
d. MATH 103- College Algebra	C
e. COMM 110- Fundamentals of Public Speaking	C
f. PSYC 111- Introduction to Psychology	C
g. PSYC 255- Child & Adolescent Psychology	C
h. EDUC 250- Intro to Education	B

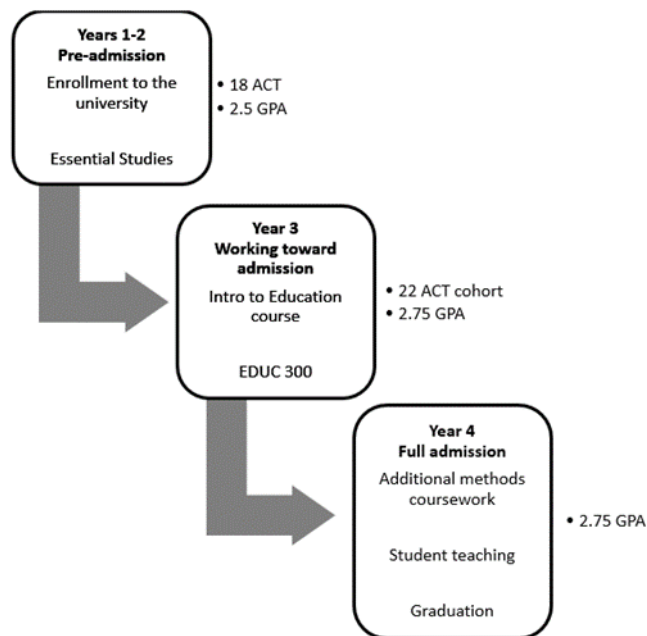


Figure 1. Admission and progression in teacher education programs

2. Successfully complete the Praxis Core Academic Skills for Educators test prior to admission to Teacher Education with scores that meet North Dakota licensure requirements.

(1) meeting the passing score of 156 for Core Academic Skills for Educators: Reading (5712), meeting the passing score of 160 for Core Academic Skills for Educators: Writing (5722), and meeting the passing score of 150 for Core Academic Skills for Educators: Mathematics (5732)

or

(2) meeting a composite score of 466 with no score being below the minimum set for each test; test minimums: 149 for Core Academic Skills for Educators: Reading (5712), 153 for Core Academic Skills for Educators: Writing (5722), and 143 for Core Academic Skills for Educators: Mathematics (5732)

3. Attain a cumulative grade point average of 2.75;

4. Pass admission interview with a score of 2 or 3 (scores of 0 or 1 considered by the Subcommittee of Admission and Retention);



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5. Consideration of recommendations from faculty, staff, or other references;
6. Proof of current student liability insurance;
7. Proof of fingerprinting and a background check clearance; and
8. Receive final approval from the Subcommittee of Admission and Retention when all criteria are met.

	Freshman Year	Summer	Sophomore Year	Summer	Junior Year	Summer	Senior Year
Fall	COMM 110 (3) ENGL 110 (3) PSYC 111 (3) GEOG 103 (3) HIST 101, 102, 103, 104 (3) UNIV 100 (1) CIS 175 (1) 17 credits	SPED 389 (3) Content Area (6) 9 credits	EDUC 250 (3)* EDUC 272 (2) EDUC 290 (2) HPER 100 (2) SCI 102 & L (4) Content Area (6) 19 credits	SPED 395 (2) EDUC 381 (3) Content Area (3) 8 credits	EDUC 426 (2) MATH 307 (3) EDUC 318 (3) SPED 386 (3) SPED 387 (2)* Content Area (3) 16 credits	SPED 396 (3) SPED 397 (3) Content Area (3) 9 credits	EDUC 481, 2, 3, 4, 5 (2) EDUC 398 (1)* SPED 382 (3) SPED 383 (2)* SPED 351 (1)* EDUC 401s (0) Content Area (8) 17 credits
Spring	ENGL 120 (3) PSYC 255 (3) HPER 210 (1) SCNC 101 & L (4) MATH 103 (3) HUM Elect. (3) 17 credits		EDUC 390 (3) SPED 384 (3) SPED 385 (2)* HUM Elect. (3) SPED 330 (3) Content Area (3) 17 credits		EDUC 480 (4) EDUC 480L (1) EDUC 380 (2) EDUC 422 (2) SPED 350 (3) Content Area (6) 18 credits		EDUC 401(2) EDUC 400 Student Teaching (10)* SPED 400b Special Ed (5)* 17 credits
	34 credits	6 credits	36 credits	8 credits	36 credits	9 credits	34 credits

*Courses indicated are designated clinical experience; highlighted courses indicate professional core

- UNIV 100 is a 1 credit course only required for incoming freshman

- 38SH for Content area coursework included in plan-will vary according to each Secondary Education Major, consult the course catalogue for requirements of each

major - Composite in Biology Education: 57 credits

- Composite in Chemistry Education: 53 credits

- Composite in Social Science Education: 43 credits

- English Education: 34 credits

- Physical Education: 38 credits

- Geography Education: 32 credits

- Health Education: 32 credits

- History Education: 34 credits

- Mathematics Education: 29 credits

Figure 2. Degree Plan for Secondary Education Majors with Special Education Double Major included

Continuance in the Teacher Education Program:

Continuance in Teacher Education Admission to teacher education does not guarantee that the teacher education candidate will be retained in the program. To continue in the Teacher Education program, the student must:

1. Maintain a cumulative grade point average of 2.75;
2. Demonstrate expected acceptable dispositions
3. Continue to obtain satisfactory recommendations from faculty, staff, and field-experience supervisors.

If requirements for continuance are not maintained, the Admission and Retention Committee may recommend suspension from the program. If any one of the above three criteria are not met, the Chair of the Division of Education will review and may appoint a 3-person subcommittee of the Admission and Retention (A & R) Committee to review the student file and relevant materials (InTASC evaluations,



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Disposition Evaluations, GPA, Coursework, etc.). A determination of action will be made by the 3-person committee that may include: mentoring, improvement plan, probation, suspension. A recommendation of suspension or expulsion from the program will be moved to the full A&R Committee.

Exiting the Teacher Education Program:

A favorable recommendation for teacher certification upon completion of the entire teacher education program requires:

1. All teacher education graduates must earn a minimum grade point average of 2.75 in their cumulative, major, minor, and professional education coursework. A grade of “C” or better is required for all professional and methods education courses, excluding EDUC 250 where a “B” is required; and
2. All teacher education graduates are required to take Praxis Subject Area Assessment Tests and Principles of Learning and Teaching (Early Childhood Education, Elementary or Secondary) prior to graduation.
3. Successful completion of electronic portfolio and presentation; and
4. A favorable recommendation from the Teacher Education Committee.

Upon exit, students may continue to expand their certifications through the addition of minors, majors and endorsements. Students seeking an additional SPED major immediately following completion of their first major must complete the major requirements which may or may not include 30 unduplicated credit hours.

4. Changes in the Program since the Last Review: Please describe any changes since the last review and include rationale for those changes.

The following changes in core courses in professional education occurred since the last comprehensive review in 2013 and focus visit in 2015. A rationale for each decision is provided.

Professional Education Courses			
	Change	Rationale	CAEP Alignment
1	EDUC 250 (2 SH) and EDUC 298 (1 SH) which are co-requisite will be combined into one course listed as EDUC 250 (3 SH) for F18-total credits maintained	This course has a common numbering in the NDUS and will now ensure the practicum experience occurs for transfer students beginning a teacher training program. For candidates who transfer a 2 SH course, EDUC 298a was created to ensure the EDUC 250 embedded clinical experience is completed.	1.1 2.3
2	EDUC 272 (1 SH) increased F18 to two semester hours	To better support candidate knowledge and application of the ISTE standards for teaching with technology, the course was increased to 2 SH.	1.1 1.5 CCT-T
3	EDUC 422 Learning Theory and Evaluation (3 SH) was separated into two courses; EDUC 290 Theories of Learning	The 422 course contained content about foundational concepts and theories of learning needed at the beginning the beginning of the	1.1



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	and Management (2 SH) and EDUC 422 Educational Assessment (2 SH)	education program to best scaffold instruction, as well as advanced methods and application of educational assessment. To best scaffold instruction, EDUC 290 now contains the foundational content and does not require admission, while EDUC 422 is advised to be taken closer to program completion and requires admission. This change was made to better support candidate's learning progressions.	
4	EDUC 380 Teaching English Language Learners (1 SH) was added to the professional education core courses in F14	This course was added to support teaching knowledge and skills related to the specific learning needs of the EL population. While concepts were integrated across methods courses, establishing a stand-alone course dedicated to specialized topics better supports candidates ready to teach all students. This change was also made in response to graduate survey results; completers indicated they did not feel well prepared to design instruction for EL students.	1.1 1.4 CCT-D
5	EDUC 380 Teaching English Language Learners (1 SH) will increase from one credit to 2 SH effective F18.	To deepen candidates' understanding of the strengths and needs of EL students, this course was increased by one semester hour. In addition, this change supports the possibility for students to use the course as the first course towards and EL endorsement through a collaborative partner.	1.1 1.4 CCT-D
6	EDUC 426 Reading in the Content Area (2 SH) was realigned with curricula; some course content on literacy was integrated into the methods instruction of EDUC 480 General Methods for Secondary Educators, thereby reducing EDUC 426 from 3 SH to 2 SH and increase EDUC 480 from 3 SH to 4 SH while keeping the program/degree total the same.	The ND state content standards underwent a series of revisions, which established Appendix D of the ELA Standards titled "ND Standards for Literacy in History/Social Studies, Science, and Technical Subjects Grades 6-12" connected to college and career readiness anchor standards for reading and writing. This integration of literacy into methods supports the curriculum focus of literacy as the "spine that holds everything together" at the secondary level. By maintaining EDUC 426, candidates have focused development of instructional strategies to teach reading and comprehension as well as a literacy-based teaching field experience.	1.1 1.4 2.3
7	EDUC 480 General Methods for Secondary Educators (3 SH) was increased from three credits to four	Credits for the course changed from 3-4 to increase the number of credits dedicated to teaching methods for all secondary majors, integrate core literacy concepts of the ELA standards, and better support Checkpoint 2 development and evaluation of the capstone portfolio.	1.1 1.4 3.4
8	EDUC 480L General Methods Field	The course was added to increase the amount of	1.1



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	Experience (1 SH) was added as a co-requisite clinical experiences for all secondary education programs	time spent in a school setting prior to student teaching, and to scaffold application of instructional methods from general methods (spring semesters only) to content methods (fall semesters only). With implementation of the new experiences, the previous requirements from EDUC 398 moved to EDUC 480L, and teacher candidates now complete a minimum of three taught lessons in EDUC 398 instead of one. This changes also supports experience in multiple settings.	2.3 3.4
9	EDUC 401s Pre-Student Teaching Seminar (0 SH) was added F15	The seminar has always been required, but was added as a transcribed course to ensure registration, streamline preparation for the student teaching experience, gauge understanding of codes of ethics and professional practices, and support co-selection of school partners for the student teaching clinical experience. EDUC 401s is required the semester immediately prior to student teaching Previously, candidates were instructed to attend the seminars, but no registration was required.	2.1 3.6
Note: SH = Semester Hour; CCT = Cross-Cutting Theme; D = Diversity; T = Technology			

Teaching Specialty Area: Composite Chemistry Education			
	Change	Rationale	CAEP Alignment
1	CHEM 121/L General Chemistry I & Lab (4 SH) and CHEM121/L General Chemistry II & Lab (4 SH) were moved from core requirements to pre-requisites of the program	The last institutional program review of the BS in Chemistry degree (non-teaching) conducted by the Division of Math and Science concluded the two courses in General Chemistry provide a broad foundation that serve as pre-requisite concepts to upper level courses. This facilitated the move of courses out of the core requirements to pre-requisite. This allowed for scaffolding of concepts to support inquiry and depth of knowledge in content of the upper courses.	1.1 5.5
2	MATH 165 Calculus (4 SH) was moved from a core requirement to a pre-requisite of the program	The last institutional program review of the BS in Chemistry indicated the skills demonstrated in MATH 165 are pre-requisite skills necessary for completing upper level chemistry courses. As such, the course was moved accordingly.	1.1 5.5
3	SCNC 322 Environmental Science (3 SH) changed from a core requirement to an elective.	This change also reduced the overall number of credits required to complete the Chemistry major while continuing to offer students elective	1.1 5.5



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	choices in the area of life science.	
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- 5. Field & Clinical Experiences:** Briefly describe the required field & clinical experiences that are specific to your program including the number of hours for early field experiences and the number of hours/weeks for student teaching or internships.

Some professional courses provide school-based field experiences under the dual supervision of the responsible University Mentor and selected competent and qualified Field Mentors in P-12 schools. Clinical Experiences/Student Teaching Experiences are an integral part of the professional education program that are designed to help the candidates understand the relationship between classroom theory and application to practice. The Director of Student Placement monitors experiences, making sure candidates are assigned to multiple settings, which increases the amount and types of diverse P-12 students with which candidates interact. Information on experiences is managed through the Field Placement database to assist in making informed decisions about where to place candidates. It is not likely candidates will be placed in schools in which they have attended. Selection for experiences are made balancing factors such as diversity of school, recommendations from district administrators, travel time & distance, school schedule, course schedule, and personal considerations (e.g., disability, socioeconomic status, transportation, family).

Field Experience (Observation and/or Practicum)	Student Teaching	Total Number of Hours
- EDUC 250- 25 hours Observation - EDUC 390- 6 hours observation - EDUC 426- 12 hours hands on (Pelican & West Fargo) - EDUC 398- 30 hours hands on (per major) - EDUC 480L- 30 hours hands on	EDUC 400- Grade 5-12 (15 weeks)	31 hours of observation 72 hours of hands on experience/field experiences 15 weeks of student teaching experiences

SECTION II: RESPONSE TO STANDARDS

- 1. Areas of Weakness from Prior Review:** How has the program addressed and resolved the weaknesses targeted in the previous program review and not previously resolved? Describe actions taken to address the weakness and provide evidence that the weakness has been resolved.

There were no areas of weakness noted from the prior review. The ESPB Content Expert Recommendation listed all standard components for Chemistry Education (13020) as “Met” as indicated in the State Team Report to PAAC (April 27-30, 2013).



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2. Course/Assessment Matrix:

- Complete the matrix below.
 - List courses that address each of the ESPB standards for your program.
(All courses listed should be linked to an electronic syllabus.)
 - List the assessments that most clearly align with each standard.
(Choose from among those listed in Section IV: Evidence of Meeting the Standard.)
- Provide a short narrative describing how the program addresses the standard.
(For example, identify course objectives, activities and related experiences).



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SECTION III: ADDRESSING THE STANDARDS

State Standard	Course Prefix and Title (with electronic links to syllabi)	Assessment (from among those listed under Section IV: Evidence of Meeting the Standard)
13020.1 Chemistry The chemistry program requires study of organic, inorganic, analytical, physical chemistry, and biochemistry. This study includes: 1. Systematic and quantitative fundamentals of chemistry. 2. Interaction of chemistry and technology and the associated ethical, environmental and human implications. 3. Physics, biology, and earth science (minimum of sixteen semester hours with at least four semester hours in each discipline). 4. Study of mathematics through calculus (minimum of one semester of calculus) and statistics.	CHEM 330/L: Quantitative Analysis/Lab (4) CHEM 360/L: Elem of Biochemistry/Lab (4) PHYS 212/L: College Physics II/Lab (4) BIOL 151/L: General Biology II/Lab (4) GEOL 115/L: Introductory Geology/Lab (4) MATH 165: Calculus I (4) MATH 323: Probability & Statistics (3)	Praxis II General Science Content Knowledge (5435)

Narrative: The Mayville State University Composite Chemistry Education program requires the study of Chemistry as outlined in the standard through specified coursework; these courses integrate basic topics from Chemistry, Physics, Life Science, Mathematics and Earth and Space Science, including key concepts, terms, phenomena, methods, applications, data analysis, and problem solving in each. Courses are aligned with standard expectations to ensure study of each required topic throughout the teacher training program. Content knowledge in the areas of study are evaluated on the Praxis II General Science: Content Knowledge exam (5435). The program consists of a total of 26 SH in chemistry [8 SH Essential Studies courses pre-requisite to the major (General Chemistry I and II, 121/121L, 122/122L) and 18 SH in the core (Quantitative Analysis I, 330/330L; Organic Chemistry I, 341/341L; Elements of Biochemistry 360/360L; Survey of Physical Chemistry, 466/466L; and Integrated Lab, 470L], 12 SH in Biology (BIOL 150/150L, BIOL 151/151L, and a biology elective), and 12 SH in Physics (PHYS 110/110, PHYS 211/211L, and PHYS 212/212L), and 4 SH in geology (GEOL 115/115L), 7 SH in mathematics including Calculus I (MATH 165) and Probability and Statistics (MATH 323), 4 SH of SCNC courses (BIOL 332 Ecology or SCNC 322 Environmental Science and SCNC 480 Science Comprehensive). The principles of inorganic chemistry and quantitative analysis are introduced in the General Chemistry sequence (121, 122) and reinforced in Quantitative Analysis I, (330). Organic Chemistry I (341) introduces the fundamentals of organic chemistry. Biochemistry (360) builds on the organic chemistry basics and reinforces the ethical and social implications relevant to the study of chemistry, biology, and incorporates technology. Survey of Physical Chemistry (466) covers the basics of physical chemistry. Integrated Lab



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(470L) requires students to independently develop and conduct their own experiment which must address at least two areas of the chemistry curriculum (inorganic, organic, analytical, physical, or biochemistry).

Required area of study for Standard 13020.1	MSU Chemistry program requirements
The chemistry program requires study of organic, inorganic, analytical, physical chemistry, and biochemistry.	CHEM 330 Quant Analysis I (3) CHEM 330L Quant Analysis I Lab (1) CHEM 341 Organic Chem I (4) CHEM 341L Organic Chem I Lab (1) CHEM 360 Elements of Biochemistry (3) CHEM 360L Elem of BioChem Lab (1) CHEM 466 Survey of Physical Chem (3) CHEM 466L Survey of Physical Chem Lab (1) CHEM 470L Integrated Lab (1) SCNC 480 Science Comprehensive
1. Systematic and quantitative fundamentals of chemistry.	CHEM 330/L: Quantitative Analysis/Lab (4)
2. Interaction of chemistry and technology and the associated ethical, environmental and human implications.	CHEM 360/L: Elem of Biochemistry/Lab (4)
3. Physics, biology, and earth science (minimum of sixteen semester hours with at least four semester hours in each discipline).	PHYS 212/L: College Physics II/Lab (4) BIOL 151/L: General Biology II/Lab (4) GEOL 115/L: Introductory Geology/Lab (4)
4. Study of mathematics through calculus (minimum of one semester of calculus) and statistics.	MATH 165: Calculus I (4) MATH 323: Probability & Statistics (3)



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13020.2 Nature of Science The program requires study of the history and philosophy of science as well as the interrelationships among the sciences.	CHEM 360/L: Elem of Biochemistry/Lab (4) PHYS 212/L: College Physics II/Lab (4) BIOL 151/L: General Biology II/Lab (4) GEOL 115/L: Introductory Geology/Lab (4)	Praxis II General Science Content Knowledge (5435) I. Scientific Methodology, Technique & History
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Narrative: The history and philosophy of science are covered implicitly in all of the science courses as topics are introduced. The interrelationships among the sciences is a natural consequence of the Composite nature of the program and the requirement to complete courses in chemistry, biology, physics, and earth science. For example, the BIOL 151/L course serves to introduce big picture theories of science; each major topic of study begins with a historical perspective of the scientific principle/philosophy, including the contributions of major historical figures (e.g., Darwin, Mendel, Watson & Crick). In CHEM 360, the big pictures introduced in BIOL 150 and CHEM 341 are elaborated by discussing the various groups of biomolecules and the processes of replication, transcription, translation, and structure-function from a chemical perspective. Exams are given to evaluate candidate knowledge of cell structure and chemistry, cellular respiration, photosynthesis, homeostasis, genetics, and protein synthesis, the major philosophies, process of scientific inquiry, history of science and interrelationships among the sciences. In the co-requisite lab, scientific principals and proven concepts explored in the course are re-created in the lab environment through application of the scientific method. In addition, candidates are able to make observations and draw conclusions from traditional chemistry based experiments as well as instrumental techniques like PCR and electrophoresis.

13020.3 Inquiry The program requires study of the processes of science common to all scientific fields.	CHEM 360/L: Elem of Biochemistry/Lab (4) PHYS 212/L: College Physics II/Lab (4) BIOL 150/L: General Biology I/Lab (4) GEOL 115/L: Introductory Geology/Lab (4)	SCNC 480- Science Comprehensive
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Narrative: The scientific method is introduced in all of the lower level courses and reinforced and applied in the upper level offerings. For example, the BIOL 150/L courses are a pre-requisite for the Composite Chemistry Education program. They are designed to introduce future science-minded individuals to the numerous divisions of science. As a foundational course, it is completed during the first semester of the designed program of study. BIOL 150/L is planned as an essential studies (i.e., general education) course and thus the breadth of the course is as wide as the depth of knowledge. In BIOL 150/L students understand and apply concepts that demonstrate the interrelatedness between various areas of science such as cell biology, biochemistry, physiology, and genetics. During the semester, the teacher candidates perform a lab procedure that introduce both topics through written, oral, and visual components. The processes of both are important in the realm of chemistry and throughout the sciences. The lab takes students through real life situations dealing with ethanol fuel that is produced through the fermentation process. Not only does this lab include the running of tests that determine the ideal conditions for anaerobic respiration and ethanol production, but also includes the incorporation of the scientific method of inquiry, which is also crucial to the advanced chemistry courses.



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In addition, the Integrated Lab (CHEM 470L) requires students to independently develop and conduct their own experiment which must address at least two areas of the chemistry curriculum (inorganic, organic, analytical, physical, or biochemistry). The science capstone (SCNC 480), required of all science majors including Composite in Chemistry Education, also requires research of a topic of the student's choice and a presentation of the research in an open forum setting. Candidates demonstrate the processes of scientific inquiry in a student-initiated project. The project begins during the junior year, and the science teaching candidate works with a faculty member to develop a project, which will culminate in a senior paper and a public, multimedia presentation to the science faculty. Students enrolled in SCNC 480: Science Comprehensive, are actively participating in a capstone project that allows them to demonstrate their ability to form scientific questions, develop a sound hypothesis, and either perform research through a comprehensive literature review, or to actively participate in experiments that help to resolve the question. In either case, students are required to analyze the results of experimentation (from the literature, or their own), explain the results of the data, and interpret the meaning of the results. Many students who participate in active research on campus present findings from their research, which is also often times presented in local, regional, or national conferences.

13020.4 Context of Science The program requires the study of the effect of social and technological context on the study of science and on the application and valuing of scientific knowledge. The program prepares candidates to relate science to the daily lives and interests of students and to a larger framework of human endeavor and understanding. The program provides the candidate with an understanding of the relationship of science to industry, business, government, and multicultural aspects of a variety of communities.	EDUC 480 General Methods for Secondary Educators (4) EDUC 480L Gen. Methods Field Exp. (1) EDUC 484: Secondary Methods for Science (2) CHEM 470L: Integrated Lab (1)	Capstone Portfolio-Standards 4 & 5 (SLO 2) CHEM 470L- Integrated Lab Independent Project
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Narrative: Integrated Lab (CHEM 470L) requires students to independently develop and conduct their own experiment which must address at least two areas of the chemistry curriculum (inorganic, organic, analytical, physical, or biochemistry). Students submit a formal lab report at the end of their experience which includes an introductory section where they are expected to connect the project to their interests and provide context for the project. Each lab report should have an introduction/abstract section, a materials section, an experimental/procedural section, a results/findings section, and a concluding section in which evidence of integration of content knowledge and relevant theory application is presented.

In EDUC 484: Secondary Methods for Science, candidates learn to make science relatable to the daily lives and interests of students; building on methods from EDUC 480/L; candidates create lesson plans that establish a purpose for learning that coincide with the “big ideas” of science. Candidates make explicit the



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relationships of science through purpose statement that answer for students the question, “Why do I need to know/do this?” They explain scientific concepts that have endurance, relevance and leverage such as: learning to think logically, problem-solving (hypothesis testing), critical thinking, learning how devices work to develop ideas of your own and invent new technology, how to make use of natural resources that affect all living things, instilling survival skills, becoming better consumers, validating findings with evidence, questioning skills, evaluating credibility, as well as building resilience in success and failure through experimentation.

13020.5 Skills of Teaching The program requires the candidate to demonstrate proficiency in methods of teaching science.	EDUC 480 General Methods for Secondary Educators (4) EDUC 480L Gen. Methods Field Exp. (1) EDUC 484 Secondary Methods for Science EDUC 398 Secondary Education Field Experience (1) EDUC 400 Student Teaching (10)	InTASC Skills Evaluation/STOT
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Narrative: Expertise in teaching develops in context over time and is not linear; a teacher candidate’s skills progress along a continuum of proficiency for particular areas at different paces. As such, teacher candidates in chemistry education receive explicit instruction in teaching methods throughout their professional education core courses as instructors use the four stage sequence of direct instruction: teacher demonstration, opportunities to practice teaching science under supervision, independently using methods in real situations (i.e., clinical experiences), and generalization/proficiency across topics and contexts (i.e., student teaching). This formative process includes modeling of effective knowledge, skills and disposition of teaching as candidates should have the opportunity to see what effective practice looks like. Candidate demonstration of the ability to teach college and career-ready science standards at increasing levels of proficiency and sophistication is required through the beginning, middle and end of formal methods instruction in designated courses and clinical experiences.

The first formal evaluation of pedagogical skills for pre-service science teachers occurs in EDUC 480: General Methods for Secondary Educators. The methods course prepares candidates to provide high-quality instruction for diverse middle level and secondary students through the conceptual approaches of understanding by design, differentiated instruction, universal design for learning and authentic literacy. Candidates develop a preliminary philosophy of teaching, learn to craft effective lessons, design varied instruction, conduct formative assessment, and respond to learner needs in order to promote positive student outcomes, meet standards, and support the development of 21st Century Skills. Opportunities to design and experiment with content instruction are embedded. Candidates transfer skills of teaching learned during the course to the classroom during the co-requisite clinical experience EDUC 480L: General Methods Field Experience, a 30-hour field placement in a secondary science classroom. Candidates observe cooperating teachers, examine the professional practice of teaching, reflectively journal, and teach a minimum of one lesson. The teacher candidate is formally observed and evaluated once during the experience; the observation includes pre and post conference reflection and feedback on teaching skills.

In EDUC 484: Secondary Methods for Science, candidates continue to develop their skills for teaching, building on methods from EDUC 480/L; candidates create lesson plans to form a unit of instruction, craft rubrics for assessment, explore classroom organization and management specific to the lab and fieldwork, and use a variety of instructional strategies adapted to subject matter content. Candidates have the opportunity to teach lessons to secondary students in the co-requisite practicum



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EDUC 398: Secondary Education Field Experience. The experience includes observation of the cooperating science teacher, teaching three science lessons of which two must be consecutive, reflectively journal, demonstrate professional disposition and model ethical practice. The science teacher candidate is observed by the content methods instructor at least once during the experience; this observation includes pre and post conferences and feedback on instruction. The second formal evaluation of teachings skills is completed in EDUC 398 by the cooperating teacher and the methods instructor, and the candidate also self-evaluates their own growth.

Proficiency in teaching skills as a beginning educator is demonstrated during a full-time supervised student teaching experience in the teacher candidate's major areas of study. Placement locations are carefully selected for 15 weeks of practice teaching at an accredited school in which experienced cooperating teachers in the classroom support the candidate in conjunction with qualified university supervisors. Teacher candidates are placed in school settings that provide them new and diverse teaching experiences to allow for greater professional growth in instructional practice. The end of program formal evaluation of teaching skills is completed by the cooperating teacher and the university supervisor, and the candidate also self-evaluates their own growth and readiness for the classroom. In addition, candidates are evaluated on teaching skills (i.e., SLO's) in the four general categories of teaching skill performance via the capstone portfolio: the learner and learning, content, instructional practice, and professional responsibility. The candidate provides artifacts that represent knowledge and performance skills as well as written rationales to explain how each artifact confirms they have attained the skills of a beginning teacher.

13020.6 Curriculum The program provides candidates with information necessary to identify, evaluate, and apply a coherent, focused science curriculum that is consistent with state and national standards for science education and appropriate for addressing the needs, abilities and interests of students.	EDUC 290 Theories of Learn. & Mgmt. (2) EDUC 426 Reading In the Content Area (2) EDUC 480 General Methods for Secondary Educators (4) EDUC 480L Gen. Methods Field Exp. (1) EDUC 484 Secondary Methods for Science EDUC 398 Secondary Education Field Experience (1) EDUC 400 Student Teaching (10)	Capstone Portfolio-Standards 4 & 5 (SLO 2)
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Narrative: Chemistry education candidates are prepared with knowledge and application skills of science content/curriculum using the 3-step Backwards Design process: (1) identify desired science knowledge and skills as per state and national content standards, (2) determine acceptable evidence/performance indicators, and (3) plan learning experiences and instruction. As such, candidates receive explicit instruction throughout professional education courses in curriculum design. This formative process includes modeling of a coherent teacher education curriculum based on the 10 InTASC Teaching Standards by course instructors; in this way, pre-service science teachers have the opportunity to see and experience a quality curriculum that addresses the needs and abilities of an effective teacher.



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Course activities and key assignments guide candidates to examine how to create a content-rich curriculum that embeds content inquiry based on literacy skills, as well as links knowledge with thinking processes. To identify a quality chemistry curriculum, in EDUC 480 General Methods for Secondary Educators & co-requisite clinical experience, EDUC 484 Secondary Methods for Science and co-requisite clinical experience, science teacher candidates unpack the ND Science Content Standards (based on national Next Generation Science Standards) to identify a manageable number of the most essential skills and topics to teach in depth. Candidates identify essential standards, those having endurance, leverage and readiness for the next level of instruction, which allow them to create a viable, literacy-based curriculum. Candidates define a purpose for learning and focus curriculum used in taught lessons around the interdisciplinary, big ideas of science: (1) patterns, (2) cause and effect, (3) scale, proportion, and quantity, (4) systems and system models, (5) energy and matter in systems, (6) structure and function, and (7) stability and change of systems.

Furthermore, in EDUC 426 Reading in the Content Area candidates produce lessons that pair science vocabulary and readings strategies with science content standards. Candidates complete an assignment in which they select vocabulary words from a specific content unit and plan for how they will conduct explicit instruction with the definitions, as well as how learners will use vocabulary through repeated exposure and resources beyond the textbook.

An appropriate, college and career ready science curriculum addresses science content, but also the affective domain and skills learners need to succeed for work, life and citizenship. Concepts of learner needs beyond academics is explored in EDUC 290, 381 and 390 through the lenses of neurodiversity, learning theory, culture and abilities respectively. Teacher candidates demonstrate the ability to write affective objectives in EDUC 422 and EDUC 480 related to learner needs, attitude, enthusiasm and motivation to study science. Candidates make explicit in their lesson plans purpose statements that explain to learners how the curriculum is meaningful and worthwhile; the purpose statement is evaluated using the common lesson planning rubric used across all MSU teacher training programs.

Teacher candidates explore content-specific resources that can make the curriculum accessible to learners in different ways and stimulate curiosity and a desire to learn. This includes online learning labs, virtual field trips, supplemental science texts, current articles about scientific discoveries and controversial topics for debate. In EDUC 480 and EDUC 484, pre-service science teachers design project/problem-based learning activities that integrate use of scientific knowledge with real-life application and 21st Century Skills of creativity/innovation, critical thinking, communication, collaboration, information and media literacy, and social-emotional competencies (e.g., flexibility, adaptation, initiative, self-directed learning, social and cross-cultural skills, productivity, accountability, leadership and responsibility). For many learners, these aspects of the curriculum are what that captures interest in the field of science and a desire to learn more. Candidates articulate their commitment to a coherence curriculum, “what to teach” in their Philosophy of Education papers in EDUC 480, and validate this commitment through content-specific curriculum artifacts in their capstone portfolio. Candidates demonstrate they can teach a viable curriculum during their progressive simulated experiences (i.e., EDUC 426, EDUC 480, EDUC 484), field experiences (EDUC 480L and EDUC 398), and in the 15-week student teaching experience.

13020.7 Assessment The program prepares candidates to use a variety of performance assessment strategies to evaluate the intellectual, social, and personal development of the learner in	EDUC 290 Theories of Learn. & Mgmt. (2) EDUC 422 Educational Assessment (2) EDUC 480 General Methods for Secondary Educators (4) EDUC 480L Gen. Methods Field Exp. (1) EDUC 484 Secondary Methods for Science EDUC 398 Secondary Education Field Experience (1)	Capstone Portfolio-Standard 6
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all aspects of science.	EDUC 400 Student Teaching (10)	
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Narrative: Candidates are prepared for educational assessment in the science classroom using the 3-step Backwards Design process: (1) identify desired science knowledge and skills, (2) determine acceptable assessment evidence, and (3) plan learning experiences and instruction. Candidates learn to ground performance expectations of what learners must do to show proficiency on the state K-12 science standards. Candidates are taught through direct, indirect, experiential, interactive, and independent teaching methods that curriculum and assessment must be developed in a way that builds students' knowledge and ability toward science performance expectations. In EDUC 290, candidates explore theoretical perspectives on learning, cognition, and behavior of learners that impact instructional/assessment decisions and respect the individual strengths and needs of learners. Candidates analyze motivation and engagement as it relates to building self-direction and how to formatively assess the learning environment. In EDUC 480, candidates learn to write both academic objectives as well as affective objectives that address the social and personal development of the learner. Candidates' study how to gather information about student interests and design performance assessments to measure both. Formative assessment and feedback is explicitly taught to candidates as a high-yield instructional strategy in EDUC 480, reinforced in EDUC 484, and demonstrated in the co-requisite field experiences.

In EDUC 422: Educational Assessment, teacher candidates demonstrate an understanding of research-based best practices in assessment and use a range of planning tools for desired learning results and multiple sources of evidence of student learning. Beginning with the identification of learning goals and purpose for assessment, candidates: (1) diagnosis diverse student needs, (2) learn to use formative assessment and feedback, (3) critique existing assessment tools using quality criteria, (4) design, adapt and select a range of evaluations, (5) use technology to support assessment practices, (6) communicate standards-based results, and (7) use assessment results to improve the teaching and learning process through data-based decision-making. Candidates complete the EDUC 422 Key Assessment, in which they critique a variety of assessments against quality criteria and then apply that knowledge to create their own assessments. This includes diagnostic, formative, standardized (critique only), summative, modified summative, performance, checklist, and rubric assessments. The development of the assessments is focused around a curricular topic appropriate to secondary science education. As a key assessment, candidates are required to demonstrate a minimum level of proficiency (C or better).

Proficiency in a variety of assessments for a beginning educator is demonstrated during the student teaching experience in science. The end of program formal evaluation of skills related to assessment practices (InTASC standard 6/SLO 3) is completed by the cooperating teacher and the university supervisor, and the candidate also self-evaluates their knowledge, skills and dispositions for assessment. In addition, candidates show knowledge and skills of assessment in the capstone portfolio; the candidate provides artifacts that exemplify both knowledge and performance skills as well as a written rationale to explain how the artifacts confirm understanding of assessment that best supports students.



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13020.8 Environment for Learning The program prepares candidates to design and manage safe and supportive learning environments in the classroom, laboratory, and field. The program reflects high expectations for the success of all students.	EDUC 290 Theories of Learn. & Mgmt. (2) EDUC 390 Special Needs in an Inclusive Setting (3) EDUC 480 General Methods for Secondary Educators (4) EDUC 480L Gen. Methods Field Exp. (1) EDUC 484 Secondary Methods for Science EDUC 398 Secondary Education Field Experience (1) EDUC 400 Student Teaching (10)	Praxis II: Principles of Learning & Teaching
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Narrative: Beginning in EDUC 250: Introduction to Education, teacher candidates begin exploring the importance of the teacher as a variable in the classroom environment. The program first focuses on creating a community of learners and being proactive to maintaining order in the classroom for productive learning. Candidates engage in discussions based on lived experience and clinical observation about how to communicate a sense of caring, organizing a classroom and prevent potential problems through planning. In addition, candidates analyze rules and expectations to create safe and respectful classroom environment by preparing a first draft of classroom rules and refining these based on course instruction and guidance. In the co-requisite practicum experience, candidates reflect on interactions of diversity, classroom management, student behaviors, teacher-student interactions, student-student interactions, classroom environment, and problem solving.

In the EDUC 290: Learning and Management Theories course, candidates study approaches to learning and behavior management through the lenses of behaviorism and constructivism. These theories are taught to ground decisions of an educator. This includes key models such as Positive Behavior Intervention and Supports (PBIS), applied behavior analysis, neuroscience, and trauma informed instruction. In addition, classroom management is examined in connection to motivation and engagement in a collaborative learning culture. Candidates work with case study scenarios that require an appropriate teacher response (e.g., student leaving a classroom, refusing to work, losing temper) and learn strategies to preventative behavior issues as well as what to do during and after an incidence/event.

In EDUC 381: Human Relations & Cultural Diversity, candidates learn how to manage the learning environment by applying a problem-solving process given their “circle of influence” as an educator. Candidates are taught to: (1) know their students in order to spot connections between the student’s behaviors and academic successes or struggles, (2) set clear, measurable, and realistic goals that align with information gathered about the student, (3) decide how to monitor growth using a concrete chart, checklist, or other tracking tool, and (4) select an action plan for the specific skills a student needs to work on. This project provides pre-service science teachers the opportunity to drill deeply into the complex layers of social, emotional, cognitive, cultural, economic, environmental factors, and diagnosed disabilities that makes each student who he or she is. This also allows pre-service teachers to apply developmentally appropriate modifications, accommodations, and differentiated lesson plans that allows the case study student to reach educational goals.

EDUC 426: Reading in the Content Area is focused on candidate preparation for a literacy-rich science classroom/lab that engages learners in opportunities to read, write, speak and listen. Candidates determine the importance of non-fiction reading in the science classroom and practice selecting materials that facilitate content vocabulary development and transfer of literacy skills.



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In EDUC 480: General Methods, science candidates learn to create an environment for learning through the following key concepts: setting objectives, providing feedback, reinforcing effort, providing recognition, cooperative learning and establishing procedures/routines. Candidates role-play scenarios for building relationships, participate in instructor-led activities that demonstrate engagement strategies, revise their set of classroom rules from the beginning of their training program, plan an ideal physical classroom layout, and draft a classroom management plan for students who are oppositional, withdrawn and anxious using the FAIR plan (Function, Accommodation, Interaction, Response). They demonstrate beginning application of these skills in the co-requisite field experience and further proficiency in subsequent clinical experiences.

In EDUC 484: Content Methods for Science, candidates build on prior coursework through the specific lens of the content area and the nuances that laboratory and field experiences bring to the science classroom. Particular topics of study include knowledge of understanding students as learners, teacher-student relationships, student-student relationships, democratic classroom practices, and behavior for lab safety. Candidates learn how to develop successful laboratory experiences, set guidelines for conduct in labs and complete a checklist for safety inspections.

Proficiency in the managing the learning environment for a beginning educator is demonstrated during the student teaching experience in science. The end of program formal evaluation of skills related to the learning environment (InTASC standard 3/SLO 1) is completed by the cooperating teacher and the university supervisor, and the candidate also self-evaluates their knowledge, skills and dispositions for the learner and learning. In addition, candidates show knowledge and skills of managing the learning environment in the capstone portfolio; the candidate provides artifacts that exemplify both knowledge and performance skills as well as a written rationale to explain how the artifacts confirm understanding how to create learning environments that best support students.

13020.9 Professional Practice The program prepares candidates to participate in the professional community, improving practice through their personal actions, education, and development. The program uses varied performance assessments of candidate's understanding and ability to apply that knowledge.	EDUC 250 Intro. To Education (3) EDUC 390 Special Needs in an Inclusive Setting (3) EDUC 480 General Methods for Secondary Educators (4) EDUC 480L Gen. Methods Field Exp. (1) EDUC 484 Secondary Methods for Science EDUC 398 Secondary Education Field Experience (1) EDUC 400 Student Teaching (10)	Capstone Portfolio: Standards 9 & 10 (SLO 4)
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Narrative: Professional practice is infused throughout the teacher training for science educators from the point of admission to program completion and beyond graduation into the first years of teaching. Principles that guide professional practice and support effective teaching for all learners are outline in the Model Code of Ethics for Educators and supported by the Reflective Experiential Teacher conceptual framework. As candidates begin their training in EDUC 250: Introduction to Education, they explore their responsibilities to the school community, to students, to professional competence and to ethical conduct. Each week of the course, candidates are responsible for leading a case study discussion from the EDUC 250 text related to what they must and should do as teachers in certain scenarios. The



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admission interview required for consideration for the training program includes questions related to professional practice as a measure beyond academics of dispositional characteristics for effective teaching.

During the training program, course specific scenarios and opportunities for reflection on professional development and growth as an educator are embedded. These help candidates build self-efficacy throughout continuance in teacher training. For example, confidentiality is specifically taught and evaluated in EDUC 390: Special Needs in an Inclusive Environment. In EDUC 380: Teaching English Language Learners, candidates are focused on improving practice related to program options for ELL's and learn how to make instructional decisions to respect the individual strengths and needs of English Language Learners. In EDUC 381: Human Relations & Cultural Diversity, candidates analyze the socio-cultural dimension that influences the educational process for individuals based on ethnicity, race, socioeconomic status, gender, exceptionalities, language, religion, sexual orientation, and geographical area. They learn to assess, plan, and implement teaching strategies to meet the needs of students from diverse backgrounds and differing value systems. Students participate in several on and off-campus experiences throughout the semester to build these skills, including a community-based practicum experience tutoring New Americans in English.

In the EDUC 480 course, science teacher candidates are grouped in cross-curricular professional learning communities (PLC's) to work as collaborative teams. This cooperative group structure prepares candidates with the professional skills required in the field of education: managing multiple demands and expectations, collaboration, reflection, assessing effectiveness of strategies and instruction, and pursuing advanced knowledge of the field to remain current in an evolving knowledge base. For 15 weeks of the semester, these PLC groups do an analytic reading of 15 articles from educational journals that relate to learners and teaching. Each candidate writes a one-paragraph reaction to content (i.e., feelings, beliefs, opinions, attitudes and analysis of article and how writer came to the conclusions), and then answers the 4 PLC Questions based on the content of the article: (1) What exactly do we expect all students to learn? (2) How will we know if and when they've learned it? (3) How will we respond when some students don't learn? And (4) How will we respond when some student have already learned? Science teacher candidates bring their perspective and ideas to the PLC group as they post their responses in an online discussion forum and reply to the reactions of classmates in other content areas of preparation. This assignment assesses candidate's knowledge of professional practice, and prepares them to contribute to their professional community during student teaching, and advocate for this collaborative work model as beginning teachers in the field.

To further engage pre-service science candidates in understanding the teachers' commitment to life-long learning and professional development, candidates participate in the annual Teacher Education Symposium, an opportunity to engage with educators and other pre-service teachers to learn together as a professional community. Topics and speakers are chosen based on feedback about preparedness from graduates, first-year teachers, supervisors of MSU graduates as well as the Teacher Education Advisory Board. To further demonstrate concepts of personal development and professional practice, the symposium is planned collaboratively with local educators, as well as faulty and teacher candidates at Turtle Mountain Community College, who travel to MSU for the day-long event. In addition, MSU leverages designation as a priority institution by the Fulbright Scholar Program to bring in an international keynote speaker in education to the symposium. In 2017 this was as scholar from Finland with expertise in the Finnish education system, in 2018 a scholar from Vietnam with a focus on teaching for social justice, and in 2019 a scholar from Hungary with expertise in active learning and 21st Century Skills has agreed to participate. At the conclusion of the symposium, candidates complete reflections about their understanding of the topics presented.



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In the required Pre-student Teaching Seminar (EDUC 401s) the semester immediately prior to student teaching, candidates sign the MSU Student Code of Conduct indicating they understand and will uphold MSU policies or professional practice and the code of ethics as written in the ND Constitution. Candidates discuss case scenarios and apply the commitment statements to their decision rationales. Candidates complete a 20 question quiz that presents them with scenarios in which they must apply ethical decision-making skills. Results are reviewed by the seminar instructor, and both class aggregate results on each question as well as by individual student are reviewed. Questions that displayed a pattern of error are addressed in the seminar. Additionally, if an individual student demonstrates a lack of understanding on items, the individual student works with the seminar instructor who re-teaches the related concepts.

Proficiency in professional practice expected of beginning science teachers is demonstrated during the 15-week supervised student teaching experience. A requirement during student teaching is for candidates to demonstrate knowledge and application of their professional responsibilities. The end of program performance assessment of skills (STOT) for these responsibilities is completed by the cooperating teacher and the university supervisor, and the candidate also self-evaluates their own personal actions, educational process and development as a science educator. In addition, candidates show knowledge and skills of professionalism in the capstone portfolio; the candidate provides artifacts that exemplify both knowledge and performance skills of professional learning, ethical practice, leadership, and collaboration, as well as written rationales to explain how the artifacts confirm the candidate is prepared to participate in a professional community and growth as a life-long learner of teaching.

13020.10 Technology The program requires the study of current, appropriate instructional technologies. The program uses varied performance assessments of candidates' understanding and abilities to apply that knowledge.	EDUC 272 Educational Technology (2) EDUC 484 Secondary Methods for Science (2) EDUC 400 Student Teaching (10) EDUC 401 Electronic Portfolio, Assessment, and Seminar (2)	Capstone Portfolio-Cross Cutting Theme of Technology
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Narrative: In conjunction with the first course in the teacher education program (EDUC 250: Introduction to Education), students enroll in the co-requisite course EDUC 272: Educational Technology. The course is designed to develop background knowledge and training in the use of educational technologies and focuses on instructional methods that efficiently integrate technologies to support P-12 student learning and achievement. Courses in the teacher education program use the International Society for Technology in Education Standards (ISTE) and InTASC principles to guide learning experiences. In order to develop the knowledge and skills necessary to effectively implement technology in the classroom, students must gain experience researching, evaluating, and implementing technology effectively. Early in their program, teacher education students complete a key assessment, the technology demonstration, to address the following learning outcomes: Identify issues and trends, evaluate and implement technology resources, and align learning goals and objectives with digitally responsible and ethical uses of technology to promote success of diverse learners. Objectives are aligned to Mayville State University's Teacher Candidate Technology Goals (see Teacher Education Handbook, page 24). Additional opportunities in the teacher education program are devoted to teaching candidates to design, implement, and assess learning experiences using technology. For example, candidates design an assessment based on an assigned article. They then administer the assessment to their



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peers, track results, analyze their understanding, and reflect on what they learned. Opportunities to develop proficiency in educational technology are encouraged in subsequent content and education courses.

During middle-of-the program methods classes, students refine their knowledge and use of educational technologies through preparation and implementation of lesson plans in simulated and real classroom environments. In EDUC 426 candidates incorporate technology-based applications in peer-taught content vocabulary lessons (e.g., ClassFlow, Canva). In EDUC 480, candidates explore digital resources for formative assessment, such as every-student response methods (e.g., Poll everywhere, plickers) and curriculum content online (e.g., photos, audio, and video) resources that bring concepts to life. In EDUC 484, candidates engage with virtual laboratory simulations and use a variety of technology-based presentation methods. Co-requisite practicum experiences support skill development in the use of current, appropriate, instructional technologies and engage candidates in the use of school-based technology resources such as databases for research and adaptation. Professional practices of instructional technologies are demonstrated during the student teaching experience at the end of the teacher education program through lesson plans that are evaluated on the integration of technology.

The culminating demonstration of technology related skills occurs through teacher candidates' development of an e-portfolio comprised of knowledge and performance artifacts (e.g. lesson plans, reflections, samples of student work, interactive media files, etc.). Through this e-portfolio, teacher candidates are evaluated on their ability to meet the MSU technology goals (see Teacher Education Handbook, page 24) and use of technology in relevant and effective ways.



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SECTION IV: EVIDENCE OF MEETING THE STANDARDS

It is expected that your program makes use of multiple assessments to ensure that all standards are met. If the program is offered in more than one site or in more than one method (e.g. online as well as face-to-face) provide aggregated (program level) AND disaggregated (site or method specific) data. Complete tables 1.A-1.D described below and provide information requested related to the two-four additional assessments you selected in 2.

1. Required Assessments

1. A Praxis II: Content Test: Complete Table 1.B reporting at least 3 years of data

Praxis II: General Science Content Knowledge 2015-2018					
Year	Content Area Test Name and Number	ND Passing Score	Total # of Test Takers	Average Score	Percent Passing
2017-2018	5435	150	0	N/A	N/A
2016-2017	5435	150	0	N/A	N/A
2015-2016	5435	150	0	N/A	N/A

1. B Praxis II: PLT (Principles of Learning and Teaching): Complete Table 1.B reporting at least 3 years of data

Principles of Learning and Teaching: Grades 7-12 2015-2018					
Year	Content Area Test Name and Number	ND Passing Score	Total # of Test Takers	Average Score	Percent Passing
2017-2018	5624	157	N/A	N/A	N/A
2016-2017	5624	157	N/A	N/A	N/A
2015-2016	5624	157	N/A	N/A	N/A

1. C Cumulative GPA at the point of completion: Complete Table 1.C reporting at least 3 years of data (Courses included in the calculation must be required for all candidates.)

Year	N (number of candidates)	Overall Average GPA	Range of GPA
2017-2018	0	N/A	N/A



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2016-2017	0	N/A	N/A
2015-2016	0	N/A	N/A

1. D Student Teaching Performance (Clinical Experience) Evaluation (please report data only in the area of content knowledge).

1. Build Table 4.4 that includes the following:
 - a. The N (number of candidates)
 - b. Proficiency scale (e.g. Beginning, progressing, proficient, exceeds proficient)
 - c. Performance results at each proficiency level (at least 3 years of data)
2. Attach an electronic copy of the performance instrument

EDUC 400 Student Teaching-Final InTASC Skills Evaluation 2015-2018				
Year	N (number of candidates)	Evaluator	Average Score	Target Score
2017-2018	0	University Supervisor	N/A	3.0
		Cooperating Teacher	N/A	
2016-2017	0	University Supervisor	N/A	3.0
		Cooperating Teacher	N/A	
2015-2016	0	University Supervisor	N/A	3.0
		Cooperating Teacher	N/A	

- 2. Additionally, select from among the following assessments for a total of 6-8. Provide a description of the assessment, a data table showing three years of results, an electronic copy of the assessment instrument (test, project, paper, etc.) and, where appropriate, the rubric or scoring guide.**

a. Pre-student Teaching Practicum Evaluations: No Composite Chemistry Education Completers

Description of the Assessment: The intended use of the InTASC Skills evaluation is to measure the core skills teachers should be able to do in today's learning context to ensure students reach their learning goals. The evaluation is a measure of the candidates teaching performance skills of the 10 InTASC standards. The evaluation was revised in fall of 2017 when the state-wide student teacher skill observation (STOT) was adopted; this should be considered as results are presented across three years of data. It is comprised of 34 items that measure the four program student learning outcomes (SLOs): learning and



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learning, content, instructional practice, and professional responsibilities. The assessment is used to monitor the advancement of teaching skills and growth from the time of admission through completion. The skills evaluation is completed by the candidate, the course instructor and/or clinical supervisor, and clinical educators. Specifically, the assessment occurs:

- at three structured progression checkpoints during preparation (the beginning-EDUC 480, middle-EDUC 484, and end of the training program-EDUC 400 student teaching)
- in all clinical experiences
- as requested by course instructors to document unsatisfactory or exemplary skill progression

Teacher candidates are trained to use the InTASC Skills Evaluation/STOT by their instructors in which the evaluation occurs. At the beginning of the program, candidates are trained by their methods instructors to self-evaluate. Each subsequent instructor explains the process when completed in their respective course. Student teaching clinical supervisors and clinical educators both complete a formal orientation in which training related to the assessment occurs. Acceptable and ideal targets are set collectively by faculty and included for students in the Teacher Education Handbook as well as provided in the corresponding course by the instructor.

EDUC 480 Content Methods-InTASC Skills Evaluation 2015-2018				
Year	N (number of candidates)	Evaluator	Average Score	Target Score
2017-2018	0	Instructor	N/A	2.5
2016-2017	0	Instructor	N/A	2.5
2015-2016	0	Instructor	N/A	2.5

EDUC 398 Content Methods-InTASC Skills Evaluation 2015-2018				
Year	N (number of candidates)	Evaluator	Average Score	Target Score
2017-2018	0	Instructor	0	2.5
		Field Mentor	0	
2016-2017	0	Instructor	0	2.5
		Field Mentor	0	
2015-2016	0	Instructor	0	2.5
		Field Mentor	0	

*non-numeric data is available in a previous database format, accessible if requested



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b. Key Performance Tasks CHEM 470L Experimental Project/Integrated Lab:
No Composite Chemistry Education Completers

Description of the Assessment: The student-directed experimental lab project serves as a measure of content knowledge and application of scientific knowledge. The student will be assessed on the submitted report using a standard rubric which is evaluated by the course instructor. The knowledge and application is demonstrated in criteria 2 and 4 where the candidate has to provide the context/background for their experiment and discuss their results as it applies to their research question. The candidate demonstrates the understanding of the processes of science through their experimental setup and discussion of results. The written report shows the relationship of the candidate to the research question and their world.

c. Capstone Project (portfolio, teacher work sample, etc.): No Composite Chemistry Education Completers

Description of the Assessment: The intended use of Capstone Portfolio is to measure teacher candidates' ability to meet the knowledge, skills and dispositions identified in the 10 InTASC standards evidenced by quality artifacts and well-written rationales. Teacher candidates integrate technology, experiences with diversity, and application of essential studies learning outcomes throughout the portfolio. The portfolio serves as a reflective tool for teacher candidates to use while exploring career placement opportunities.

The assessment is used to monitor progression towards mastery as Checkpoint 3 is preceded by Checkpoints #1 and #2. Checkpoint #3 is completed after 10 weeks of the Student Teaching Experience with a self-evaluation of the teacher candidates' portfolio entries and a public presentation; the portfolio and presentation are evaluated by two faculty reviewers. Faculty Portfolio Reviewers rate using the rubric, and scores are reconciled for a final rubric score and letter grade.

Training to complete the capstone project begins upon admission to the EPP; teacher candidates are provided with the Teacher Education Handbook which contains all instructions and rubrics of the capstone portfolio. Expectations are introduced during the admission process through modeling and discussion by the instructor of EDUC 250: Introduction to Education (Checkpoint 1), revisited and expanded upon during methods courses (Checkpoint 2), and again at student teaching through pre-student teaching seminars and during-student teaching seminars (Checkpoint 3). Candidates are provided with the Portfolio Appendices, which address training for specific requirements.

Capstone Portfolio: Final Results 2015-2018				
Year	N (number of candidates)	Evaluator	Scores	Target Score
2017-2018	0	Reviewer 1	N/A	157-240
		Reviewer 2	N/A	
		Reconciled	N/A	
2016-2017	0	Reviewer 1	N/A	157-240
		Reviewer 2	N/A	



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		Reconciled	N/A	
2015-2016	0	Final Reconciled Grades	A = 0 B = 0 C = 0 D = 0 F = 0	C or better

*Previous version of portfolio in quality assurance system with only reconciled grade for reporting. Individual candidate raw scores available for each candidate in the database if requested.

Capstone Portfolio: SLO 2: Content Knowledge & Application Results 2015-2018				
Year	N (number of candidates)	Evaluator	Scores	Target Score
2017-2018	1	2 Reviewers Reconciled	3.56	3.0
2016-2017	1	2 Reviewers Reconciled	3.42	3.0
2015-2016*	2	N/A	N/A	N/A

*Previous version of portfolio in quality assurance system without option to separate SLO 2: Content (began fall 2016). Individual candidate raw scores available for each candidate in the database if requested.

d. Employer survey results related to content knowledge: No Composite Chemistry Education Completers

Description of the Assessment: Findings from the surveys administered to supervisors of first-year teachers during the spring of each academic year for the prior year graduating cohort are provided; the first-year teachers for the 2018 survey are completers from the 2016-2017 academic year. Results are displayed as an aggregate and are not disaggregated by program level or content area. The Supervisor Survey asks those who supervise first-year teachers to assess the novices' readiness for the teaching profession. The survey asks supervisors to assess the quality of completers' instructional practices, abilities to work with diverse learners, abilities to establish positive classroom environment, and levels of professionalism. The survey is administered to direct supervisors of teacher preparation completers employed in schools approximately one year after the teachers completed their preparation programs. Participation in this survey was limited to supervisors of prior-year completers who were employed as teachers. The actual response count for the 2018 Supervisor Survey for Mayville State University is 39% (11/28); the response rate for 2017 was 71%, for 2016 was 88.2% and for 2015 was 40% (first year of using the common metric supervisor survey). Data presented in should be used with caution. Survey respondents are not necessarily representative of the institution's completers. While these findings could prompt discussions about ways to improve coursework, clinical experiences, and efforts to connect graduates with teaching jobs, the unknown response rate limits the extent to which these data should be used to inform decision-making. The Supervisor Survey is one tool for assessing the effectiveness of MSU teacher preparation program graduates and should be used in combination with multiple and varied assessments and data sources for programmatic decision making. The table below presents frequencies and percentages. There is a complementary report which presents the aggregate results for the state for all institutions that contributed data which may be helpful in providing context and data for benchmarking institution-level results.



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For this content expert review, survey items related to content preparation have been disaggregated and compiled from the 2015, 2016, 2017 and 2018 results. As required, an electronic copy of the supervisor survey results, ND aggregate, and NExT aggregate are included with this report. NExT holds the copyright on these surveys, and they have given permission for the teacher preparation programs in ND to use the instruments as a collaborative group. Institutions are not allowed to alter the surveys and must administer it “as is.” However, items may be added to the end the surveys for individual institutional use. In exchange for free access to the surveys, MSU contributes results of the surveys to a state aggregate.



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Supervisor Survey-Selected Items for Content Knowledge	Year	Total Respondents	Unable to Respond		Disagree		Tend to Disagree		Tend to Agree		Agree	
		n	#	%	#	%	#	%	#	%	#	%
Effectively teaches the subject matter in his/her licensure area.	2018	20	0	0	0	0	1	5.0	6	30.0	13	65.0
	2017	18	0	0	0	0	2	11.1	6	33.3	10	55.6
	2016	29	0	0	0	0	2	6.9	5	17.2	22	75.9
	2015	11	0	0	0	0	0	0	4	36.4	7	63.6
Selects instructional strategies to align with learning goals and standards.	2018	20	0	0	0	0	0	0	8	40.0	12	60.0
	2017	18	0	0	0	0	2	11.1	7	38.9	9	50.0
	2016	29	0	0	0	0	2	6.9	5	17.2	22	75.9
	2015	11	0	0	0	0	1	9.1	3	27.2	7	63.6
Designs activities where students engage with subject matter from a variety of perspectives.	2018	20	0	0	0	0	3	15.0	5	25.0	12	60.0
	2017	18	0	0	0	0	5	27.8	5	27.8	8	44.4
	2016	29	0	0	0	0	4	13.8	4	13.8	21	72.4
	2015	11	0	0	0	0	1	9.1	3	27.2	7	63.6
Accounts for students' prior knowledge or experiences in instructional planning.	2018	20	0	0	0	0	2	10.0	5	25.0	13	65.0
	2017	18	0	0	0	0	2	11.1	10	55.6	6	33.3
	2016	29	0	0	0	0	5	17.2	6	20.7	18	62.1
	2015	11	0	0	0	0	2	18.2	3	27.2	6	54.5
Designs long-range instructional plans that meet curricular goals.	2018	20	0	0	0	0	2	10.0	9	45.0	9	45.0
	2017	18	0	0	2	11.1	4	22.2	4	22.2	8	44.4
	2016	29	0	0	2	6.9	5	17.2	9	31.0	13	44.8
	2015	11	0	0	0	0	1	9.1	3	27.2	6	54.5
Regularly adjusts instructional plans to meet students' needs.	2018	20	0	0	1	5.0	5	25.0	5	25.0	9	45.0
	2017	18	0	0	1	5.6	3	16.7	6	33.3	8	44.4
	2016	29	0	0	1	3.4	4	13.8	7	24.1	17	58.6
	2015	11	0	0	0	0	1	9.1	3	27.2	7	63.6
Connects core content to students' real-life experiences.	2018	19	0	0	0	0	1	5.3	6	31.6	12	63.2
	2017	18	0	0	0	0	3	16.7	7	38.9	8	44.4
	2016	27	0	0	0	0	4	14.8	8	30.0	15	55.6
	2015	11	0	0	1		2	18.2	2	18.2	6	54.5
Helps students develop critical thinking processes.	2018	20	0	0	0	0	2	10.0	7	35.0	11	55.0
	2017	18	0	0	0	0	5	27.8	6	33.3	7	38.9
	2016	29	1	3.4	1	3.4	4	13.8	7	24.1	16	55.2
	2015	11	0	0	0	0	0	0	5		6	54.5
Helps students develop skills to solve complex problems.	2018	20	0	0	0	0	2	10.0	10	50.0	8	40.0
	2017	18	0	0	0	0	4	22.2	8	44.4	6	33.3
	2016	29	0	0	1	3.4	5	17.2	7	24.1	16	55.2
	2015	11	0	0	0	0	0	0	3	30.0	7	70.0
Makes interdisciplinary connections among core subjects.	2018	20	0	0	0	0	1	5.0	9	45.0	10	50.0
	2017	18	0	0	0	0	4	22.2	8	44.4	6	33.3
	2016	11	0	0	0	0	1	9.1	3	27.2	7	63.6
	2015	11	0	0	1	0	2	18.2	3	27.2	5	45.4
Knows where and how to access resources to build global awareness and understanding.	2018	20	0	0	0	0	4	20.0	9	45.0	7	35.0
	2017	18	1	5.6	0	0	2	11.1	7	38.9	8	44.4
	2016	29	0	0	1	3.4	4	13.8	8	27.6	16	55.2
	2015	11	0	0	0	0	1	9.1	3	27.2	7	63.6



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e. Graduate survey results related to content knowledge: No Composite
Chemistry Education Completers

Description of the Assessment: The transition to teaching survey is administered to completers the academic year following their graduation. All completers are invited to complete the survey, but those who are teaching complete an additional section to rate the quality of their preparation. The survey is administered approximately one year after the graduates completed their preparation programs and is not disaggregated by program area. The response rate for the 2018 Transition to Teaching Survey was 63% (26/41). This report should be used with care. Survey respondents are not necessarily representative of institution's completers. A response rate exceeding 30% on a survey is generally considered adequate, and findings can prompt discussions about ways to improve coursework, clinical experiences, and efforts to connect graduates with teaching jobs. The Transition to Teaching Survey is one tool for assessing the effectiveness of ND teacher preparation program graduates and should be used in combination with multiple measures.

Part A of the survey asks completers about their licensure and employment status. Completers who are not teaching only complete Part A. Part B of the survey asks completers to rate how well prepared they felt across multiple domains of teaching including instructional practices, diverse learners, learning environment, and professionalism. Completers were asked to respond using the following scale: disagree; tend to disagree; tend to agree; and agree. Part C of the survey asks completers about the context of the schools where they are teaching, including the environment and available resources. Part D of the survey asks completers if they would recommend their teacher preparation program and teaching profession to others.

For this content expert review, survey items related to content preparation have been disaggregated and compiled from the 2015, 2016, 2017 and 2018 results. As required, an electronic copy of the transition to teaching survey results, ND aggregate, and NExT aggregate are included with this report. A final note to acknowledge that the transition to teaching and supervisor surveys may not be reproduced or distributed, in whole or in part, without the prior authorization of the Bush Foundation. Surveys and results are intended for internal audiences only.



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Transition to Teaching Survey- Selected Items	Year	Total Respondents	Disagree	Tend to Disagree		Tend to Agree		Agree		
		n	#	%	#	%	#	%	#	%
Effectively teach the subject matter in my licensure area.	2018	20	0	0	1	5.0	6	30.0	13	65.0
	2017	21	0	0	2	9.5	5	23.8	14	66.7
	2016	28	1	3.6	3	10.7	10	35.7	14	50.0
	2015	10	0	0	0	0	3	30.0	7	70.0
Select instructional strategies to align with learning goals and standards.	2018	20	0	0	0	0	8	40.0	12	60.0
	2017	21	0	0	1	4.9	9	42.9	11	52.4
	2016	28	0	-	1	3.6	10	35.7	17	56.7
	2015	10	0	0	0	0	6	60.0	4	40.0
Design activities where students engage with subject matter from a variety of perspectives.	2018	20	0	0	3	15.0	5	25.0	12	60.0
	2017	21	1	4.8	0	0	10	47.6	10	47.6
	2016	28	0	-	1	3.6	12	42.9	15	53.6
	2015	10	0	0	0	0	4	40.0	6	60.0
Account for students' prior knowledge or experiences in instructional planning.	2018	20	0	0	2	10.0	5	25.0	13	65.0
	2017	21	0	0	2	9.5	10	47.6	9	42.9
	2016	28	0	-	1	3.6	15	53.6	12	42.9
	2015	10	0	0	0	0	5	50.0	5	50.0
Design long-range instructional plans that meet curricular goals.	2018	20	0	0	2	10.0	9	45.0	9	45.0
	2017	21	1	4.8	1	4.9	12	57.1	7	33.3
	2016	28	0	-	1	3.6	14	50.0	13	46.4
	2015	10	0	0	0	0	6	60.0	4	40.0
Regularly adjust instructional plans to meet students' needs.	2018	20	1	5.0	5	25.0	5	25.0	9	45.0
	2017	21	1	4.8	3	14.3	5	23.8	12	57.1
	2016	28	1	3.6	0	-	12	42.9	15	53.6
	2015	10	0	0	1	10.0	4	40.0	5	50.0
Connect core content to students' real-life experiences.	2018	19	0	0	1	5.3	6	31.6	12	63.2
	2017	21	0	0	0	0	8	38.1	13	61.9
	2016	28	0	-	0	-	9	32.1	19	67.9
	2015	10	0	0	0	0	5	50.0	5	50.0
Help students develop critical thinking processes.	2018	20	0	0	2	10.0	7	35.0	11	55.0
	2017	21	0	0	5	23.8	9	42.9	7	33.3
	2016	28	0	-	4	14.3	11	39.3	13	46.4
	2015	10	1	10.0	0	0	3	30.0	6	60.0
Help students develop skills to solve complex problems.	2018	20	0	0	2	10.0	10	50.0	8	40.0
	2017	20	0	0	7	35.0	6	30.0	7	35.0
	2016	28	0	-	5	17.9	11	39.3	12	42.9
	2015	10	1	10.0	1	10.0	4	40.0	4	40.0
Make interdisciplinary connections among core subjects.	2018	20	0	0	1	5.0	9	45.0	10	50.0
	2017	21	0	0	2	9.5	8	38.1	11	52.4
	2016	28	0	-	2	7.1	11	39.3	15	53.6
	2015	10	0	0	2	20.0	4	40.0	4	40.0
Know where and how to access resources to build global awareness and understanding.	2018	20	0	0	4	20.0	9	45.0	7	35.0
	2017	21	1	4.8	1	4.8	9	42.9	10	47.6
	2016	28	0	-	5	17.9	11	39.3	12	42.9
	2015	10	1	10.0	0	0	7	70.0	2	20.0



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f. Additional assessment of choice [SCNC 480 Science Comprehensive](#): No Composite Chemistry Education Completers

Description of the Assessment: The purposes of the SCNC 480: Science Comprehensive is to document the skills and knowledge that each student has acquired while completing their degree (i.e. content knowledge, lab skills/techniques, technology skills), to prepare them as a presenter, and to publicly recognize their accomplishments. Science teacher candidates near completion of the science education program are required to complete the Science Comprehensive/Capstone course SCNC 480. Students research a topic and develop a research question to present to the science faculty. Of the required presentation and the rubric for evaluation, four are specifically related to the chemistry education standards. This includes criteria 3, 4, 5, and 10/11 (the rubric was revised in 2016 with overall criteria being reduced).

Criteria 3: The student demonstrates confidence and understanding of research topic during presentation.

Criteria 4: The student has constructed, analyzed, and identified a scientific argument or research question.

Criteria 5: The PowerPoint develops a central theme or idea, directed toward the appropriate audience, and communicates scientific information relative to the research topic.

Criteria 10/11: The student demonstrates ability to synthesize information and apply it to answering questions during question/answer period.

Utilize a Mentor: Students in this course will be assisted in finding a science faculty member to serve as a mentor based on the student's chosen research topic, their personal preferences, and the mentor availability. The mentor will assist the student in their pursuit of knowledge. The mentor may provide reasonable additional requirements outside of the requirements contained in this document such as providing a practice presentation to them before the final presentation and/or a more detailed timeline for progress in the development of the paper or presentation. As such, mentors and students should work out these expectations early in the semester. If the mentor expectations are not being met, the mentor may resign from their mentoring duties and the student may be left without a mentor for the rest of the semester.

Research paper: Students are required to submit a research paper that is a minimum of 10 pages in length. This ten page requirement does not include the title page or the bibliography. The paper should reflect the time involvement in the project. The format should follow that of a good scientific paper such as might be found in a referenced science journal including an introduction section, research section, and a conclusion section. An example paper has been placed in the Moodle course shell that provides expected format and citation style for your paper. There is an expectation that at least 20 acceptable (peer reviewed) sources will be used and represented in the reference section. Students are strongly encouraged to submit their paper to the instructor or mentor for feedback. Before final submission of the paper to the instructor, students are required to submit their paper to the writing center for an edit review and provide confirmation of the consultation session. Keep in mind that the writing center may not be staffed during finals week of classes or finals week.



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Public Presentation: Students will need to present the findings of their research in a public presentation using appropriate presentation media, typically Power Point. The public presentations should be scheduled with the instructor by October 5th and students have up to the end of December 6th to give their presentation. Presentations are expected to be a minimum of 20 minutes and will be followed by a question and answer session involving the presenter and other students and faculty members in attendance. Students are expected to begin their presentation with a question of what they were attempting to learn or discover as a result of their research. The presentation should include content that demonstrates that the student has nearly completed an undergraduate science degree and should include multiple aspects of the main topic. Students are expected to provide data cite sources within the slides of their presentations. A hardcopy of the bibliography page should also be provided to the audience before the beginning of the presentation. Be prepared to respond to potential questions asked by the attending audience. It will be expected that anything a student shares as part of their presentation will be able to be appropriately defend if questioned, or explain in reasonable detail if asked. The overall experience is intended to enhance each student's ability to research a topic of their choice, to critically analyze the topic, and to present their findings in both a written paper and an oral presentation.

Grading: A > 90% B > 80% C > 70% D > 60%

SCNC 480: Science Comprehensive Presentation Results 2015-2018				
Year	N (number of candidates)	Evaluator	Score	Target Score
2015-2018	0	Criteria 3 Average	N/A	3 out of 5 C or Better
		Criteria 4 Average	N/A	
		Criteria 5 Average	N/A	
		Criteria 10 Average	N/A	
		Presentation Content Average	N/A	
		Presentation & Paper Final Grade	N/A	

3. Respond to the following questions:

- a. **Analysis of findings: Describe how the data provided above demonstrate that candidates in the program meet the standards.**

The courses required for the content specialty area of science align with the required program standards for teacher licensure. All content areas of study required for a composite chemistry education program: organic, inorganic, analytical, physical chemistry, and biochemistry, systematic and quantitative fundamentals of chemistry, technology, implications, physics, biology, earth science, mathematics and statistics. Analysis also indicates the program systematically assesses teacher candidates at the beginning, middle, and end of their teacher training, evaluating knowledge and skills of the program standards



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Although there have been no completers of the Composite Chemistry Education program in the last three years, there are five MSU undergraduates completers currently licensed to teach secondary chemistry as well as two at the graduate level (Master of Arts in Teaching). This is due to candidates passing the Praxis II General Science Content Knowledge exam (5435) for licensure across all areas of secondary science, not just chemistry. These graduates include:

- 4 BSED Composite Biology Education
- 1 BSED Math Education with a second major in Chemistry
- 2 MAT with licensure area in biology education

It is noted that chemistry education is considered a low enrollment program. This has been an overall enrollment trend at the undergraduate level in secondary education programs compared to early childhood and elementary programs. When students take the Praxis II content exam they take general science not because they have a general science degree, but because it makes them more attractive to meet employer needs. This leads to a consideration of a general science teacher licensing program instead of a chemistry or biology specific program of study, which may better fit ESPB program standards. Placing all teacher candidates in a general science education program would reduce low enrollment programs, however it may not ultimately change the number of candidates graduating with licensable degrees in secondary science education. It may even lower enrollment as candidates may not be attracted to the “chemistry” or “biology” name, or impact enrollment of the Master of Arts in Teaching program-either positively or negatively. There are many factors that would need to be considered from an EPP and institutional perspective to consider a change, yet findings suggest it should be explored as an option.

b. Response to findings: What changes have you made in your program as a result of data analysis? Provided a rationale for your decision.

Through the program review process, two important topics have been brought to the attention of the EPP that requires further consideration in a continuous improvement model. These items will be added to the Division of Education annual accountability management system (AMS) as part of the yearly action plan. An update on these action items will be documented in the 2018-2019 AMS report available in November, 2019.

- Evaluate the option of moving to a General Science teacher licensing program for the 2020-2022 academic catalogue instead of Composite Chemistry Education and Composite Biology programs.
- Examine course descriptions for CHEM 341, 360, SCNC 480 for increased clarity in alignment to standards.