

Office of the Provost and
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**NEW DEGREE PROGRAM PLANNING NOTIFICATION OF INTENT
(PLANNING NOI)**

Program Information

Program Name: **Bachelor of Arts in Education: General Science – Middle Level**

Institution Name: Western Washington University

Degree Granting Unit: College of Sciences and Technology

Degree: B.Ed. Level: Bachelor Type: Education

Major: General Science - Middle Level CIP Code: 13.1203

Minor: N/A Concentration(s): N/A

Proposed Start Date: September 2010

Projected Enrollment (FTE) in Year One: 5 At Full Enrollment by Year: 2012: 10
(# FTE) (# FTE)

Proposed New Funding: N/A

Funding Source: State FTE Self Support Other

Mode of Delivery / Locations

Single Campus Delivery: Western Washington University, Bellingham Campus

Off Site (Enter Locations): N/A

Distance Learning: N/A

Substantive Statement of Need

See Attached

Contact Information (Academic Department Representative)

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10.29.09

Endorsement by Chief Academic Officer

Date

Bachelor of Arts in Education: General Science -- Middle Level New Degree Program Planning Outline

Background

Western Washington University is the leading producer of mathematics and science teachers in the state. It has a unique organization, the Science, Mathematics and Technology Education (SMATE) Program housed in the College of Sciences and Technology that is responsible for the content and also the science and mathematics pedagogy preparation of future elementary (K-8) and secondary (middle and high school) teachers. The faculty that teach in these programs are scientists and mathematicians from the discipline departments and their colleagues in the Woodring College of Education who work together seamlessly to design and deliver coherent teacher preparation programs.

The teacher preparation programs serve undergraduate and post baccalaureate students graduating on average 40-50 high school mathematics and science teachers each year, and more than 150 elementary teachers at the Bellingham campus alone. Bellingham undergraduate elementary education students major in one of 19 approved academic majors including General Science – Elementary. This major includes 51 core credits designed to prepare future elementary teachers to be elementary science specialists but it does not result in an additional endorsement in science. Thus, while program graduates are “highly qualified” to teach science at the middle level as required by the No Child Left Behind Act of 2001, they do not receive sufficient preparation for a subject area science endorsement at either the middle or secondary level.

In 2003, Washington State established an integrated Middle Level Math/Science teaching endorsement. Because the level of content knowledge required to effectively teach both middle school mathematics and science would have resulted in a major of over 140 credits in addition to the elementary education program, we chose not to develop an endorsement program.

With the elimination of the state’s integrated middle level endorsement and establishment of separate Middle Level Mathematics and Middle Level Science endorsements in 2008 we reexamined the requirements, and determined that we can offer a quality General Science – Middle Level major (88 core quarter credits) that in combination with the elementary professional program will result in both Middle Level Science and Elementary Education endorsements. We expect the audience for this program to primarily be elementary education students but we also expect to serve some students who would have otherwise pursued a secondary level science endorsement in order to prepare for teaching in middle school science.

The degree has been designed by the Science Education Group in SMATE to ensure that students meet or exceed the state competency requirements based on the knowledge of our content and education courses. The education courses draw on the strengths of both the Elementary and Secondary Education Departments, and the content courses are assembled from existing courses in the science departments and SMATE. The impact on course enrollment will therefore be minimal.

Relationship to Institutional Role, Mission, and Program Priorities

Western Washington University is committed to engaged excellence in fulfilling its tripartite mission of teaching, scholarship, and community service in a student-centered environment, with a liberal arts foundation and opportunities to develop professional skills.

The common core of the Western Washington University educational experience is the liberal arts and sciences including these dimensions: analysis and communication; creative and aesthetic expressions; knowledge of civilization and cultural pluralism; scientific and mathematical understanding; and a sense of perspective on the nature and processes of human development. Professional and applied programs are built upon institutional

strengths and are responsive to national, state and regional needs. At the same time, the University values its historical role in preparing future teachers, in preserving unique curricular emphases, and its more recent efforts to integrate new technologies in teaching and learning.

The Woodring College of Education vision *fosters community relationships and a culture of learning that advances knowledge, embraces diversity and promotes social justice*. Woodring provides nationally recognized programs for the preparation of teachers through an overarching conceptual framework that centers on *preparing thoughtful, knowledgeable, and effective educators for a diverse society*. The conceptual framework entails ongoing reflection on our beliefs regarding learning and teaching, widespread discussion, and opportunities for input from our partners across the university and in P-12 schools and the community.

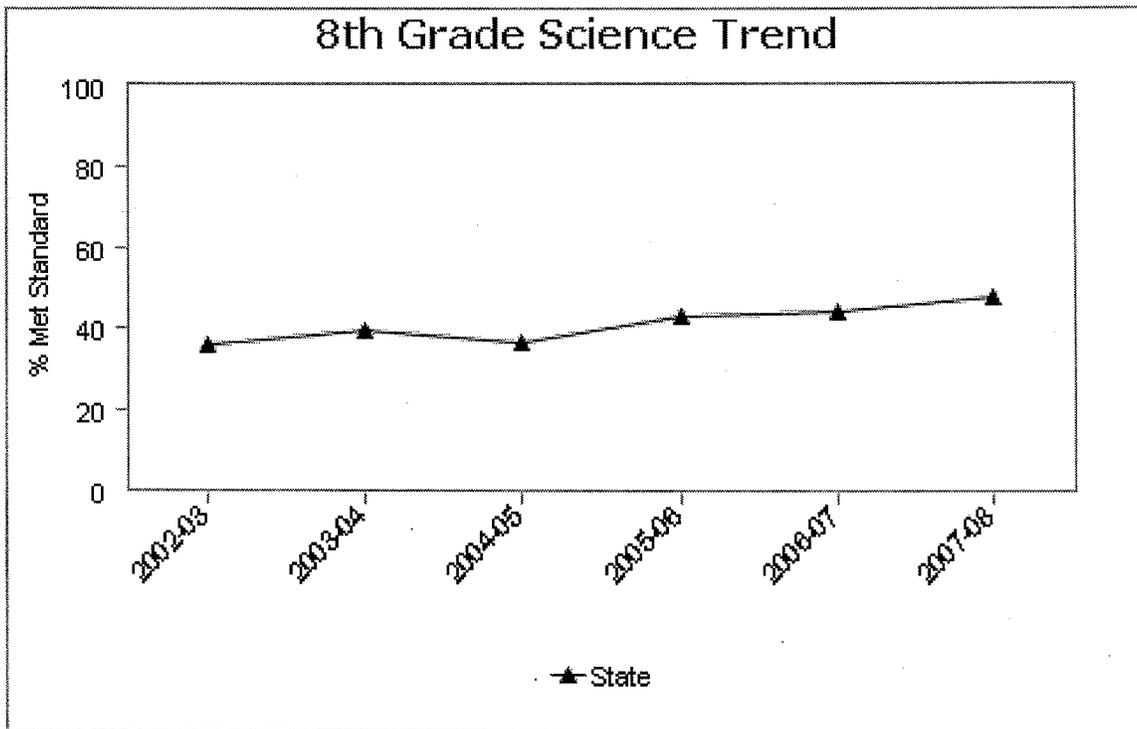
The mission of the Science, Mathematics and Technology Education (SMATE) Program is *to be a national model of the highest quality preparation of future elementary and secondary science teachers; to participate in research and dissemination of new knowledge in science education and education reform to the university and K-12 communities; and to serve as a valuable science and education resource to the university and broader community*.

From 2003 through 2008, SMATE faculty led the North Cascades and Olympic Science Partnership, a National Science Foundation funded project involving 28 school districts, two education service districts, four community colleges, Washington State LASER, the Naval Undersea Museum, Washington State MESA, and Western Washington University. The \$12 million project involved close interaction of the partners to reform science education in grades 3-10 through teacher professional development, implementation of new curriculum materials, and development and support of learning communities in the schools.

The proposed BAE in Middle Level Science clearly reflects the program priorities of SMATE and supports the role and mission of the institution and of the Woodring College of Education, the unit responsible for teacher certification.

Substantive Statement of Need

According to the synthesis of the research conducted by the Education Trust, "...teacher effectiveness is the single biggest factor influencing gains in achievement, an influence bigger than race, poverty, parent's education, or any of the other factors that are often thought to doom children to failure" (Carey, 2004). The graph below illustrates the five-year trend of 8th grade students who have met standard by scoring proficient or above on the science Washington Assessment of Student Learning.



While the percentage of students meeting standard is increasing, the slope is very shallow. Unless we can increase the slope of this curve it will be decades before most 8th grade students reach proficiency in science. The key to improving student performance in science is to improve teacher effectiveness. In the short term we need to work with inservice teachers but in the intermediate and long term, if we are going to meet and sustain our goal of science literate high school graduates, we must prepare and graduate new teachers who can effectively teach science to middle school students.

The *Washington Learns* final report issued in 2006 by a steering committee and advisory committees appointed by the governor also cites the need to increase the effectiveness of teachers in order to increase the achievement of middle school students in science. One of the initiatives for a world class education (Math & Science: A Competitive Edge) is to increase the preparation of K-12 students through a strategy for building expertise in math and science teaching including these actions:

- Increase math and science course requirements for all prospective teachers.
- Ensure that teachers assigned to teach math and science in middle and high schools are prepared to do so.
- Provide professional development and training for teachers to use the state curricula materials.

According to the biennial *Educator Supply and Demand in Washington State 2006* report produced by the Office of the Superintendent of Public Instruction (OSPI), Middle Level Math/Science is one of nine teacher educator roles that show high degrees of shortage. District perception of shortage areas supported this finding through a mean survey response of 4.19 on a scale from 1 (considerable surplus) to 5 (considerable shortage).

The OSPI report notes that the federal No Child Left Behind highly qualified teacher (HQT) requirement imposes a new demand for teacher quality that has impacted the employability of elementary-prepared teachers. Although authorized by the state to teach any subject grades K through 8 they are less likely to have demonstrated their content knowledge in core academic subjects through the equivalent of a major or state-validated test as required by the federal rules. (Veteran teachers have the option of meeting HQT through a points-based highly objective uniform state standard evaluation.) The report also notes that middle school is a challenging area for recruitment and assignment due to the HQT requirement. However, HQT is not the only issue. Input solicited by Woodring from school district administrators over the past four years through its job search seminars is clear: the middle

school teacher who not only meets HQT but holds an endorsement in the subject(s) to be taught is by far the most prepared and employable.

The Professional Educator Standards Board (PESB) study *Ensuring an Adequate Supply of Well-Qualified Math & Science Teachers* (2008) presented an endorsement profile of Washington middle level science teachers that at a summary level shows 86.4% of fulltime equivalency (FTE) is taught by endorsed teachers. However, of the total 1033.8 FTE only 32.3% is endorsed in a science subject; 43.5% is endorsed in Elementary Education (and not in a science subject); 10.6% is taught by teachers working under a second tier pre-endorsement certificate (that does not require content preparation for classroom assignment); and the remaining 13.6% is taught by teachers who do not hold an endorsement considered appropriate by the PESB. The study also clarified the need for addressing the issues relating to teacher recruitment and cited Western Washington University's programs as exemplary.

The Higher Education Coordinating Board (HECB) has produced several studies that identify the need for additional science teachers in the region. The 2006 *Assessment of the Higher Education Needs of Snohomish, Island, and Skagit Counties Area* involved extensive research on the higher education needs of Snohomish, Island and Skagit counties and reported preparation of middle and high school teachers, particularly in mathematics and science, as a priority. The HECB biennial *State and Regional Needs Assessment* report (February 2006, revised) found that "The state higher education system must develop strategies to increase the number of qualified K-12 teachers and administrators in key shortage areas" which includes both science and middle level math/science.

The HECB's most recent assessment report published in March 2009 is *A Skilled and Educated Workforce: an assessment of higher education and training credentials required to meet employer demand*. The results indicate a mismatch in supply and demand for positions in research and science occupations. Clearly, our response should start with rigorous preparation of K-12 students in order to increase student learning in the sciences. In addition, the PESB report referenced above was cited and an observation made that with respect to math and science there is "...ample evidence that shortages exist in key fields."

There is extensive documentation of the need for a robust, middle level science program that will allow elementary teacher candidates to specialize in science. This is supported by data on middle school student proficiency in science, research and legislation that recognizes the positive impact of teachers who have deep content knowledge, and an established and ongoing shortage of highly qualified middle school science teachers in Washington State.

Statewide Strategic Master Plan

The proposed middle school science program supports the goals of the 2008 Washington Strategic Master Plan for Higher Education:

Goal 1: create a high-quality higher education system that provides expanded opportunity for more Washingtonians to complete postsecondary degrees, certificates, and apprenticeships.

Goal 2: create a higher education system that drives greater economic prosperity, innovation and opportunity.

With respect to Goal 1, the program will clearly expand the options and opportunities for Washington teacher candidates to complete a specialized degree program leading to an additional endorsement in a teacher shortage area. Goal 2 is addressed through the rigorous science curriculum that responds to the *Washington Learns* initiative to "... hold our students to math and science standards that are at least as high as those in other states and nation." By doing so, we will be preparing a workforce that can compete in the global economy, respond to state and regional employer demand, and contribute to the economic prosperity of Washington State.

Relationship to other Institutions and Uniqueness of the Program

There are currently six institutions of higher education in Washington State that offer a middle level science endorsement. None are delivered through an explicit middle level science major for elementary education students, and most require few or no specific science content courses. By offering our program through a full major we will provide teacher candidates in Washington State with a unique opportunity to earn a Bachelor of Arts in Education that specializes in middle level science.

Curriculum

The curriculum for the proposed major demonstrates a coherent design, depth, breadth, and sequencing. The major is designed around performance-based learner outcomes aligned with state competencies for the middle level science endorsement. Coursework in the major includes a specific course on middle school curriculum and instruction, developmental issues concerning middle school students, and cognitive skill development strategies. Completion of this major along with the elementary professional program results in future teachers who have satisfied the requirements for recommendation for a Residency teacher certificate endorsed in Elementary Education and Middle Level Science. Students will declare the major through SMATE once they are admitted to Woodring's elementary program and will typically have completed some courses in the academic major at the point of admission.

Program admission requirements recognize a strong articulation plan with the community colleges. Western Washington University is a party to the Statewide Elementary Education DTA Major Ready Pathway (MRP) Agreement dated 2005. Transfer students with 45 credits+ or an AA apply to Western and the elementary professional program concurrently or to the elementary program soon after admission to the University. The major includes three courses that serve as general university requirements (SCED 201, 202, 203) that are also offered through three regional community colleges. In addition, students may complete academic major course equivalents articulated with community colleges and baccalaureate higher education institutions.

Admission to the elementary professional preparation program requires the following:

- Admission to Western Washington University
- Completion of a minimum of 45 credits
- Cumulative grade point average of 2.75 or higher for the last 45 credits
- Acceptable West-B (basic skills) scores
- Completion of an English composition course with a grade of B- or higher
- Completed application and proctored essay

The proposed 88-credit major is listed below, followed by the existing 106-credit elementary education professional program that includes two science teaching methods courses delivered by SMATE faculty.

Major – General Science – Middle Level

88 Credits

Course	Title	Qtr. Credits
SCED 201	Matter and Energy in Physical Systems	4
SCED 202	Matter and Energy in Earth Systems	4
SCED 203	Matter and Energy in Life Systems	4
SCED 294	Investigative Science	4
SCED 370	Science and Society	3
ASTR 103	Astronomy for the Liberal Arts	4

Course	Title	Qtr. Credits
BIOL 204	Intro to Evolution, Ecology and Biodiversity	4
BIOL 205	Intro to Cellular and Molecular Biology	5
BIOL 206	Into to Organismal Biology	5
CHEM 121	General Chemistry I	5
CHEM 122	General Chemistry II	5
CHEM 123	General Chemistry III	4
GEOL 211	Physical Geology	5
GEOL 212	Historical Geology	4
GEOL 252	The Earth and it's Weather	4
MATH 115	Precalculus II	5
PHYS 101	Physics Analysis	4
PHYS 102	Physics and Society	3
PHYS 104	Physics Applications	4
300 Level	Elective	4
SEC 450	Introduction to Middle School	4

Elementary Education Professional Program
106 Credits

Course	Title	Qtr. Credits
<i>Professional Studies Core</i>		
EDUC 301	Educational Psychology I: Development & Individual Differences	4
EDUC 302	Educational Psychology II: Motivation, Learning, and Assessment	4
EDUC 310	Teacher and the Social Order	4
SPED 364	Teaching All Students	4
ELED 370	Introduction to Teaching	5
IT 344	Basic Instructional Technology Skills (pre-requisite)	1
IT 442	Classroom Use of Instructional Technology – Elementary	3
<i>Methods, Curriculum Content, and Field Experiences</i>		
ART 380	Art Educating the Child (3)	3
ELED 425	Social Studies for the Elementary School (4)	5
ELED 470	Developing Teaching (5)	5
ELED 471	Documenting Teaching (5)	5
ELED 480	Literacy II: Beginning Communicators (5)	5
ELED 481	Literacy II: Fluent Communicators (5)	5
ELED 491	September Experience	2
ELED 492	Practicum: Experience in Literacy Methods	4
ELED 494	Internship – Elementary (middle school placement)	14
HLED 455	Health Education Grades K-8 (2)	2
MATH 381	Teaching K-8 Mathematics I (4)	4
MATH 382	Teaching K-8 Mathematics II (4)	4
MATH 383	Teaching K-8 Mathematics III (4)	4
MATH 491	Mathematics Internship Seminar (2)	2
MUS 361	Music for Elementary Teachers (3)	3
PE 345	Physical Education for Elementary School (3)	3
SCED 480	Science Methods & Curriculum for the Elementary School (5)	5
SCED 490	Laboratory/Field Experience in Elementary Science (Practicum) (3)	3
SPED 430	Problem Solving for Diverse Needs	3

Infrastructure

All resources for delivery of the proposed major are in place. There are no new courses to develop, no new faculty or staff positions to hire, and the facilities are state-of-the-art. The SMATE Learning Resource Center is a 15,000 square foot facility that includes classrooms, laboratories, and a resource room with over 15,000 books on standards, assessment, curricula and activities. The facility is open to all Western students and the public. In both its approach and facilities, the SMATE program is a national model for teacher training in undergraduate mathematics, science and technology education.

Faculty

There are 12 fulltime permanent science education faculty associated with SMATE including the director and 11 members drawn from science discipline departments and from Woodring elementary and secondary education programs. All but one hold terminal degrees in their respective disciplines and most have extensive experience teaching in the K-12 schools. The existing faculty, along with other faculty who teach content for the science discipline departments, is sufficient to support the proposed middle level science program. Key program faculty are listed below.

ALEJANDRO ACEVEDO-GUTIÉRREZ (2002) Assistant Professor. BSc, Universidad Autonoma de Baja California Sur, Mexico; PhD, Texas A&M University.

EMILY BORDA (2005) Assistant Professor. BS-Chemistry, Gonzaga University; MEd-Educational Leadership and Policy, MS, PhD-Chemistry, University of Washington.

ANDREW BOUDREAUX (2008) Assistant Professor, BS University of California-Berkeley, PhD, University of Washington.

DONALD BURGESS (2004) Assistant Professor. MS Education-Biology, State University of New York, Cortland, PhD, University of British Columbia.

SUSAN M. DEBARI (1998) Associate Professor. BA, Cornell University; PhD, Stanford University.

DEBORAH A. DONOVAN (1998) Associate Professor. BSc, MSc, University of California-Davis; PhD, University of British Columbia.

STEVEN GAMMON (2002) Professor. BA, Bowdoin College; PhD, University of Illinois at Urbana-Champaign.

MOLLY LAWRENCE (2007) Assistant Professor, MS, PhD, University of Georgia

SCOTT R. LINNEMAN (2000) Associate Professor. BA, Carleton College; PhD, University of Wyoming.

GEORGE D. NELSON (2002) Professor. BS, Harvey Mudd College; MS, PhD, University of Washington.

CHRIS OHANA (1999) Associate Professor. BA, University of California-Berkeley; MA, University of Oregon; PhD, Iowa State University.

JAMES E. STEWART (1987) Professor. BA, BS, University of North Dakota; MS, PhD, University of New Mexico.

Administration

Administrative and support services are provided by the SMATE director, Dr. George Nelson, a 1.0 FTE assistant director responsible for operation of the Learning Resource Center, and a 1.0 FTE support staff.

Students

Student enrollment in the program is projected conservatively at five FTE per year with full enrollment at 10 FTE. Western Washington University was recently awarded a five-year, \$900,000 grant from the National Science Foundation's Robert Noyce Teacher Scholarship Program to encourage talented science, technology, engineering, and mathematics (STEM) majors and professionals to become middle- and high-school mathematics and science teachers. With the support of this grant and associated recruitment efforts the actual FTE may be greater.

The College of Science and Technology Strategic Plan includes the following objective and associated actions related to diversity.

OBJECTIVE III: To achieve diversity within the student body, faculty and staff.

ACTIONS: We seek to create an open and welcoming environment that attracts and supports diverse and traditionally underrepresented groups and participates in the process of internationalization. To achieve this we will:

1. Engage in sustained outreach to underrepresented groups in K-12 schools and community colleges.
2. Recruit more international and non-resident students and offer sister university student/faculty exchanges.
3. Offer more diversity-focused scholarships and coordinate with the Provost's Diversity Scholarship program.
4. Recruit and retain faculty, staff and students from underrepresented groups.
5. Develop, where appropriate, curricula in CST that expose students to the intersection of science, technology and culture.

The Woodring College of Education 2008-2010 Diversity Action Plan includes these long-term goals:

- Assist all students entering Woodring in developing an understanding of and appreciation for diverse perspectives.
- Ensure that all graduates of Woodring College of Education have a comprehensive understanding and experience with diverse perspectives.
- Actively support recruitment/retention activities that enhance candidate diversity within Western Washington University and Woodring College of Education.
- Actively support recruitment/retention activities that enhance faculty and staff diversity within WWU and WCE.
- Encourage and promote a wider distribution of knowledge about diversity.
- Cultivate relationships with diverse University and community groups.
- Assure that the Diversity Committee functions effectively within the Woodring College of Education.

Woodring makes aggressive efforts to recruit and retain a diverse student population. One of the most successful strategies is the support of a position in the College specifically targeted to the recruitment and retention of diverse students. Private donor funding maintains a scholarship program to support freshman and sophomore students of color entering the teaching profession.

Accreditation

Western Washington University is accredited by the Northwest Commission on Colleges and Universities. Accreditation was reaffirmed following a comprehensive evaluation in 2008.

Western Washington University teacher education programs are approved by the Washington State Professional Educator Standards Board. The most recent program approval site visit was conducted in 2005. The middle level science endorsement program was approved in 2009.

Woodring College of Education as the "unit" responsible for educator preparation programs offered by Western Washington University is accredited by the National Council of Accreditation of Teacher Accreditation. Continuing accreditation was most recently approved following a site visit in 2005.

Program Assessment

Consistent with state program approval and regional and national accreditation standards, we have designed a comprehensive assessment system by which student performance relative to learning outcomes (endorsement competencies) will be aggregated, analyzed, and used for program improvement.

Woodring College of Education evaluates candidate performance by analyzing data from multiple sources of evidence and engages in continuous program evaluation and improvement activities and dialogue involving program faculty, College councils and committees, and partners across the University and in P-12 schools and the community. Data from key assessments of candidate performance are entered into the Woodring Information System (WIS) for organization and management. The WIS supports a web-based interface for creating a wide range of reports pertaining to candidate admissions, continuation, internships, and program completion. In addition to data on candidate performance, reports are generated on the results of course evaluations, exit surveys of interning students, and placement surveys of completers.

Design of the proposed middle level science program involved education faculty from each of our science disciplines, the chair of the elementary education department who also teaches science methods courses, and a secondary education faculty member with expertise in middle level pedagogy. No new courses are required and all student assessments are in place. Faculty will routinely review candidate performance data from their content courses and access candidate performance and survey data from the WIS through summary reports generated by the Woodring assessment coordinator. Decisions about program improvements will be made following review and discussion at bi-monthly meetings of science education faculty.

Student Assessment

Student learning outcomes of the proposed program are defined by the middle level science endorsement competencies. Listed below are the 13 “common core” competencies.

Middle level science teachers...

1. Demonstrate an understanding of the characteristics of and interactions between and among living systems.
2. Demonstrate an understanding of the characteristics of and interactions of matter and energy between and among physical systems.
3. Demonstrate an understanding of the characteristics of and interactions between and among earth and space science.
4. Are prepared to teach inquiry, issues, and nature of science.
5. Embrace technology as an essential tool for teaching and learning science.
6. Create a community of diverse learners who engage in scientific discourse to construct meaning from their science experiences and possess a disposition for further exploration and learning. They use, and can justify, a variety of classroom arrangements, groupings, actions, strategies, and methodologies. They encourage students, individually and collaboratively, to observe, ask questions, design inquiries, and collect and interpret data in order to develop concepts and relationships from empirical experiences.
7. Organize safe and effective learning environments that promote the success of students and the welfare of living things. They require and promote knowledge and respect for safety, and oversee the welfare of all living things used in the classroom or found in the field.
8. Understand the major concepts, principles, theories, and research related to middle level development, and they provide opportunities that support student development and learning.
9. Understand the major concepts, principles, theories, and research underlying the philosophical foundations of developmentally responsive middle level programs and schools, and they work successfully within these organizational components.
10. Understand the major concepts, principles, theories, and research related to working collaboratively with family and community members, and they use that knowledge to maximize the learning of all middle level learners.

11. Understand the complexity of teaching middle level learners, and they engage in practices and behaviors that develop their competence as professionals.
12. Create environments that enable students to develop and apply essential concepts and skills.
13. Understand the major concepts, principles, theories, standards, and research related to middle level curriculum and they use this knowledge in their practice.

The learning outcomes associated with each common core articulate the state-required content and pedagogical knowledge and skills. Sources of evidence of proficiency include course-based assessments such as problem sets, laboratory activities, exams, research projects; program level assessments such as a science curriculum topic study and the teacher work sample capstone performance assessment; practicum and internship field-based performance; and the West-E subject knowledge test.

An alignment of learning outcomes with program courses/field experiences and sources of evidence of proficiency will be submitted with the full program proposal.

Budget

The state-funded proposed middle level science program does not impact the SMATE program budget. All courses are currently offered and the existing infrastructure, faculty and staff can easily accommodate full student enrollment projected at 10 FTE.